RAILROAD GAZETTE

FRIDAY, AUGUST 18, 1876.

The "Rocket" in 1876.

The engraving and the following description of this historical engine are copied from *The Engineer*. The "Rocket" was exhibited at the recent "loan collection of scientific instruments" at the South Kensington Museum:

It is hardly necessary to say that the prize of £500 offered by the directors of the Liverpool & Manchester Railway in 1829, was awarded to this engine. It has been well and truly said that the ages of faith are past and gone. If by faith is meant credulity, so much the better; and however willing, nay, anxious, we may be to believe in the authenticity of relics, owing to a somewhat exalted feeling of reverence for the past, we cannot shut our eyes to facts. We recollect being very much struck by the remark of a critic in the *Times* for Jan. 21, 1865, in the course of an article on "Patriarchal Engines at South Kensington," to the effect that the general appearance of the Rocket was not very different to that of a locomotive of the present day. At that time we were only familiar with the appearance of the Rocket as given in contemporary works, such as Wood's *Practical Treatise on Railroads* and the *Mechanics' Magazine* of the day. It was a matter of astonishment to us how such a remark could possibly have been made by any one who had the use of his eyes; but a very cursory examination of the engine itself shows how the mistake arose, for it is abundantly clear that the Rocket illustrated in the present number is a very different machine from the Rocket which ran on the Liverpool & Manchester Railway in 1829. The old engine has, in truth, been subjected to a very extensive series of "restorations," and it is our firm belief that very little of the original work remains. When the Institution of Mechanical Engineers met in Newcastle, in 1858, the members paid a visit to Messrs. Stephenson's works, and, on inquiry being made for the Rocket, it was stated that so many parts were wanting that to make a complete engine of it a large portion would have to be made anew. The boiler, or a portion of it, together with some of the gearing, was stowed away in one of the yards, but if our information be correct, there was nothing like a perfect machine. According to the drawing in the *Mechanics' Magazine* for Oct. 24, 1829, the cylinders were placed at an angle of about 45 deg., and the valve gear is altogether different from that of the engine now at South Kensington. In the original there was no smoke-box—that now on is manifestly a subsequent addition, if the dimensions given in a later portion of this article be correct—and the chimney started from the end of the boiler, instead of from the top of the smoke-box, as is now the practice. The framing which carries the cylinders is all recent, and very recent, too, we think. The driving-wheel is obviously of a very modern type, but the writer of the *Times'* article above referred to, not being aware of this, took the opportunity to enlarge upon the fact that Stephenson actually used wood for his wheels. The connecting-rod has been restored in wood.

It is not at all unlikely that the original drawings of the Rocket are still in existence at Messrs. Stephenson's works at Newcastle, and it would be a matter of some interest to know whether this is the case. The fact, however, of the restored Rocket being so strikingly unlike the Rocket as depicted in contemporary works, rather militates against this suggestion. The machine is described by Wood as follows: "The boiler is cylindrical with flat ends, 6 ft. long and 3 ft. 4 in. diameter. To one end of the boiler is attached a square box or furnace 3 ft. long by 2 ft. broad, and about 3 ft. deep; at the bottom of this box the fire-bars are placed, and it is entirely surrounded by a casing, except at the bottom and on the side next the boiler, leaving a space of about 3 in. between this casing and the furnace, which space is kept constantly filled with water; a pipe on the under side, communicating with the boiler, supplies it with water; and another pipe at the top allows the steam to pass off into the boiler. The upper half of the boiler is used as a reservoir for steam, the lower half being kept filled with water. Through the latter part of the boiler copper tubes reach from one end of the boiler to the other, being open to the fire-box at one end and to the chimney at the other. In the boiler of the Rocket there were twenty-five tubes 3 in. in diameter. The cylinders were placed one on each side of the boiler, and worked one pair of wheels only. They were 8 in. in diameter, with a stroke of 16½ in.; diameter of large wheels, 4 ft. 8½ in." As our illustration is drawn to scale it is possible to compare the dimensions of some parts of the present Rocket with those of the original machine.

It would be very desirable to ascertain something of the history of the prize locomotive subsequent to the period when it ceased running on the Liverpool & Manchester Railway. We have heard it said that the Rocket passed into the hands of Messrs. Thompson, of Kirkhouse Colliery, near Carlisle, where it was employed in drawing coal on the railway belonging to that firm. We do not, however, state this as a positive fact.

Contributions.

Answer to Professor Dr. E. Winkler, of Vienna.

Dear Sir: Your letter of July 12 has come to my hands, and I now take pleasure in answering it.

Six years ago I wrote a paper for the Society of German Engineers of Berlin, for the purpose of laying before them the leading principles of design of American truss construction, and to draw their attention to the great development and progress made in this country. It was written with all possible care; it gave ample and just credit to the good things furnished in the art of bridge building by Europe, and more especially by Germany, and it was received not without good opinions from a number of those best able to judge.

It contained this passage, much objected to by you:

"*It is no exaggeration if it is asserted that at present America has a system of iron truss bridges, which supersedes every European one, not only as regards strength and simplicity, but also in reference to economy and carefully determined proportions.*"

You have caused to be printed in the paper of the Society of Austrian Engineers and Architects, 1874, the following: "This (referring to the just quoted passage, which you make the foundation of your criticism) *shows that the author is no theorist and American.*"

And again, "*One deficient in theoretical knowledge may be a pretty good practical engineer, but for comparison of several systems something more is required.*"

Again, in your letter you take the above harmless and truthful passage as a pretext for the following remark:

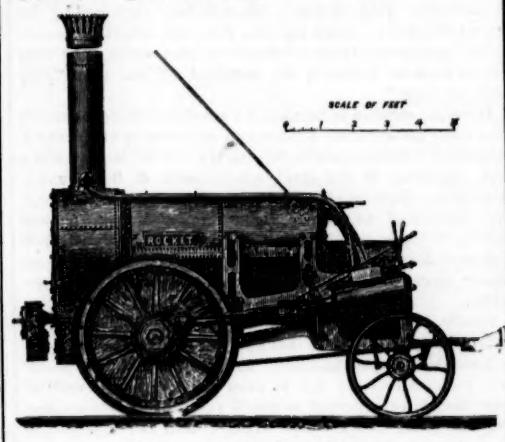
"*But the remarks I made on your article in the Journal of German Engineers had reference to the presumption with which you speak so contemptuously of the performances of European engineers.*"

Sir: I hold that the teacher of a High School should have respect for *truth* and *justice*. On *my* side there was neither presumption nor contempt. I *have* given all honor due to European design, as those cannot help but admit who have read my paper, or who have read the translation thereof published in the *Railroad Gazette* two years ago. You must confess that if America *has* a system of *truss bridges* better than any one in Europe, I have the full right to say so, the more so if I expressly give credit for what Europe has done, and if I—as was done—bring the proof for it. Not only have you printed the above most *offensive* and *most unjust* criticism, you also have used disrespectful language at the meeting of your Society. That this is the fact I know from an Austrian engineer who was present at the meeting. My article having been written expressly for the practical members of the Society of German Engineers, what shadow of a right had *you* to take it up in the meeting of the Austrian society?

Returning to *your* criticism, I comment on your leading ideas thus:

"Professor Winkler is versed as to the purely mathematical part of the art of bridge building; it is here where his strength would lie, which he estimates abundantly high. Nobody but those who are mathematicians have a right to compare several systems of design. If any one else, *not believed* by him to be a mathematician, dares compare systems of bridges, or if such a one asserts—even with proofs ever so common-sense and convincing—that one system which the Professor does not know is better than any other, it follows that such a man is *presumptuous;* he has committed a *crimen læsæ majestatis* on the professor-cultus; he speaks *contemptuously* of European engineers; he is *ignorant and—American.*"

In vain, Mr. Professor, you try to cover yourself by an alleged duty or right to attack me.



The "Rocket" in 1876.

And here again I assert, and am ready to prove at any time, that the Americans have produced a system of *truss bridges* superior in economy, and superior in scientific and in theoretical respects, any other used in Europe or any that you have described in your books.

And, using your own phraseology, nearly: It would seem more becoming to you in future to be silent and not criticize at all things that you are not prepared for, or the scientific education of the engineers of a whole nation.

You have yet to prove that you are the man capable of judging as to the value of one system of bridges in comparison with another.

The next point which I wish to clear up is this, that you now assert you have appreciated American practice, and that you have done so in letters to your friends. But none of your books that came to my eyes up to 1874 prove anything thereof. On the contrary, *wherever* you write about American design you have some blame for it, but no word of recognition. You might at least have stated that the structures which you mentioned date from a time when in Germany, Austria, etc., as good as nothing was known either of theory or of practice of truss bridges. Where there was so much place for doubtful formulæ, a few lines might also have been devoted to give justice to the American originators of the systems which are used in Europe with only different details. That you did not appreciate American practice, and that you did look down on American engineering generally, is also evident from the very article (1874) at the end of which you descend on us. In vain you declare that you had no better information, for you quote Malezieux. If you needed more information, why did you not apply to him? Why at least did you not avail yourself of my own article to increase your knowledge and broaden your views? The answer simply is that you thought little of American design. In fact we need no better proof for it than the *very words of your attack.*

Since that time from all sides there come notes on American truss bridging; other engineers, as Mr. Pontzen, etc., have dared to express—your authority and probable displeasure notwithstanding—precisely the same views as those advanced by me, and hence you have thought it proper to wheel around and to enter on your retreat, in which I shall no further molest you. In order, however, to lay before you the merits of American bridge engineering, and to show you what can be achieved by laying aside high-sounding, unstable theories, I mention the following:

Colonel Long, in his book published in 1841 (translated into German) was probably the first in applying the principle of continuity to compound (wooden) truss bridges, and continuous wooden bridges were built in this country, probably, before England commenced building continuous iron lattice girders.

Town is the originator of these European lattice bridges, which in fact are nothing else than Town bridges of iron with rivets instead of tree-nails. Of trusses (Fachwerk) Long, Howe and Pratt must be considered the fathers of all your designs with parallel chords. What they have done in wood, Whipple has analyzed and proportioned for iron. The principles and proportions which he established in 1846 are not superseded, and are not improved upon to any noticeable extent by European theorists. He had then already determined the proper height of trusses to 1-6th to 1-8th and even 1-4th of the spans; he fixed the last angle of diagonals to 45 degrees; he had perfectly correct principles of general proportions, and as early as 1846 proved that the proper construction for the Menai Strait bridge would be the quadrangular trapezoidal truss. He described and had analyzed and understood the double triagular truss, before in Austria the totally misunderstood and incorrect Neville trusses were built. Mr. Whipple in 1840 had built the first understood bowstring bridge, whose strains in chords and webs he showed how to calculate and in part also how to determine graphically in 1846. He showed also that bowstrings are less economical than trapezoidal trusses; while you, Mr. Professor, think that you prove 30 years later that the reverse is true.

Mr. Whipple, also, and not Mr. Ordish, is the originator of the system of suspension bridges, of which there is a specimen in Prague, Bohemia.

Finally, the link suspension bridge (1796), the introduction of the eye-bar into bridge-building (1796), the first wire suspension bridge (Philadelphia), were American novelties.

You have denied to non-theorists the capacity for judging as to the values of systems; why is it, then, that Americans whom you class among those poor in theory, have done more in bridge-building than, I may well say, any of the other nations, and why have they been able to select the best system while European theorists still contradict each other as to which system is the better? Simply because it is possible to compare systems even without your formulæ, and again because your formulæ are more delusive than conclusive.

Mr. Professor, you have claimed and you have exercised what you thought a right, namely, that of sharp criticism; you therefore have also given me the right to criticise you and to tell you what I hold to be true.

You know it is impossible to calculate the strains in lattice bridges, more especially those of their webs. But you give first a reasonable but insoluble theory (Henrici's skeleton structures, 1867); then a common theory; also a revised theory, and a theory with "still more accurate" results. All are wrong: you would better cancel 50 pages of formulæ, for this is the only solution of the Gordian knot. You have a whole chapter, rich in formulæ, on the "theoretical value of constructions." But we want the real values, and what you call "co-efficients of construction" will never do.

This whole chapter is of so plain a nature that every one who knows the principles of elementary mathematics with a few words (and perhaps without them) can find his way himself.

When you come to treat compressional web members you write in *Italics:* "The section must be of such a form that the necessary safety against crippling is gained without (!) using more material than needed for crushing. It is true this condition cannot always (!) be filled without losing (!) other advantages. *On this question of course only (sic) a theoretical (!) investigation can decide.*" Without comment I state that you then give 37 pages on compression members, with a great many formulæ, but without a single reference to experiments, and this chapter is a part of your *practical treatise* on bridge design! Of course you took occasion to condemn Mr. Whipple's round-bar post in *country bow-string* bridges (designed in 1840 and 1846, when nothing but bar-iron and castings were to be had of which to construct iron bridges).

From your practical bridge treatise, the following are quotations: You say on page 115, in Italics,

2. "The pin can be put through any (!) part of the chord, its position being indifferent," if the construction otherwise can take up tension or pressure.

4. "*It cannot be proved* that the center lines of members must pass through the same point, though it has been put down as a principle. It is not necessary that the point of intersection be in the centre line of gravity of the chord."

Now, sir, I think, with your mathematics, you *could* very easily have proved that the eccentric connection must throw great extra strains on the rivets. If you cannot prove this value by figures, of course experiments *must* be made before going ahead in theory. On page 26 of your article in the Austrian engineering paper you gave evidence that you did not even know what deck beams are, and you imagine them to be deep rails to be used (like Hartwig rails) without cross-ties, as if in a country where wooden sleepers are cheap and where wooden bridges are still built in numbers, a wholly iron railroad superstructure could be thought of. You recommend the use of many thin pieces instead of a few heavy ones (pages 47–80, second part of Iron Bridges, 1872); for instance two angles instead of one T bar, for the remarkable reason that "*unsound places in the iron can more easily be discovered.*" The whole practical part of your book contains *not a single reference to experiments or experience*—all is matter derived directly from theory, as also is the short paragraph on riveting.

These few quotations are sufficient to point out your position in practical and theoretical matters. But I also object that by your great attention to the mathematical part of the common theory of continuity you lead young enthusiasts astray. There is not even a theoretical advantage connected with these structures, if properly proportioned, over single-span trusses properly proportioned.

No doubt it is great satisfaction to you that your advice has been asked by the government board of engineers. But is it

not a thing worthy of meditation why this high board of an old empire of thirty-five million inhabitants asks advice in bridge matters of a man who never built an iron bridge himself, and never was connected with the erection of one?

I maintain that in technical matters the executive profession must guide the teaching department. This must learn and teach what things have been, how they were done, and how they are done at present; but the first party is not bound to construct as the second party theorizes.

You entirely misunderstand me in regard to theoretical matters. Science and theory in their right senses are appreciated by me at least as highly as by yourself, since I take particular pains to prevent their abuse. But it happens too often that in technical matters mathematicians think they can master a complex practical problem by throwing into it a quantity of abstractly true formulæ, as if an object whose physical conditions do not answer the assumptions *ipso facto* would participate of the truth of those mathematics.

The first question with me, in working on a problem, is whether laws and theories good for one form of bodies are still applicable for bodies which by rivets or bolts are composed of several parts. If the answer is in the negative, theory has only to point out *what experiments* necessarily must be made.

On the contrary, there are books which might justly bear the name of "*misapplied mechanics.*" For instance, while the rather new method of examining the state of interior strains of a solid homogeneous body by investigating the equilibrium of the molecules is highly and justly appreciated, the same method should not be transferred to the calculation of the pressure (modified by friction *and* cohesion) of a mass of earth, sand, mud, boulders, gravel, pebbles, sometimes soaked with water, sometimes dry, sometimes frozen!

You say my views as to excessive theoretical training in Germany are things of the past, and are no more recognized there. I hope not, and I think I see indications that the promotion in that country of unstable theories in technical matters has reached its climax. It is useless to shut the eyes before things that the whole world sees and knows.

It cannot be ignored that such nations as America and England, which lead in technical matters, at the same time are the least inclined to far-fetched theories. Mr. Reuleaux (as early as 1873) reported that American machinery stood at the head of all, and he has expressly stated that it would be erroneous to suppose their designs to be *less scientific.* This year Herr Reuleaux has very plainly said and has published in a Berlin daily paper that the American Exhibition has shown that Germany has made little or no advance (in spite of this high scientific training, studying and theorizing in nearly a dozen polytechnic universities), which publication of course caused him some blame from ultra-patriotic papers.

Again, I have learned that a high German commissioner has said with great disappointment: "There we sit among heaps of integrals, while other nations make progress!"

It is my opinion that a great share of this complaint should fall upon technical education. You refer to Professor Sternberg's analysis of the unhinged arch. You cannot possibly mean to compare your own productions with this. The theory of the homogeneous arched beam, used in the Coblenz bridge, was a necessary addition to the theory of the flexure of solid beams. It is complete and rational, if used properly. Its production was necessary, and Herr Sternberg was instrumental in developing its laws. The length of the formulæ is not objectionable at all, if it is indispensable and if the object is reasonable. But the shortest formula becomes abominable if it has no sense (as for instance a formula intended to determine the diameter of rivets to be used for each length of span (see page 143, 2d part, of your book, 1872). With good reason Herr Sternberg's analysis formed the basis for the calculations for the St. Louis bridge in 1867, the form of bridge (arch) once being fixed upon. But I may here state that in 1867, when in St. Louis, I strongly recommended to Colonel Flad arches with three hinges, which advice, however, at that time was not so readily accepted as I understand it would be to-day (since the difficulties in the practical execution of unhinged arches on account of temperature, etc., have been sufficiently noticed).

You refer to simplifications in the theory of arches and in graphical statics due to you. As far as they are simplifications, I welcome them; as far as they are to prove your own superiority, I reject them. Any one who is mathematically prepared can find some minor relations as regards subjects which are just scientifically on the carpet. Or, as Lamé says (page 23, Lecons, etc., 1866): "The majority of these ideas present themselves so naturally that they belong to all." Thus in the summer of 1867 I invented continuous girders with hinges in alternate spans (patented by Gerber in Bavaria, December, 1866); the method of calculating the strains in trusses by use of *moments only* (applied 1867 in the construction of a sickle-shaped roof in St. Louis); canti-lever suspension bridges (known as Sedley's patent); the same treatment of suspension bridges with stiffened floor, applicable to all triple-hinged stiff arches and suspension bridges, as given by Culmann, without knowing that these things were no longer new. I do not quote this as an argument in my favor; but I wish it especially understood that any one else under similar circumstances would have done no less.

I have good reason to be convinced that the theory of bridge design has been much more complicated than simplified in Germany; that having been so complicated and unnecessarily spread out it was even considered a relief that a graphical method of determining strains simultaneously was developed, while the old method must be learned too. Yet it has even been asserted that it is indispensable, and it has been put into execution, to treat the new method by the science of new geometry, so that in fact students have to study two more sciences added to the already overcrowded list of sciences to be cultivated. I do not say that these two additional sciences are not likely to do some good in technical education, if there really is surplus time for them, and if they are taught within reasonable limits; but the mode of lecturing in German polytechnic schools being such that each professor tries to give his favorite subject as a complete unit, poor students no longer know what to study and what to leave unstudied, and, having recognized that they cannot learn all these high sciences, a great many, and probably the majority, give up following the lectures, attending them merely *pro forma.*

I positively know that it is possible to so simplify the theory of bridge-building that an *additional* graphical solution becomes desirable only in very rare instances, which latter opinion is shared, as I understand, by a high authority, namely, Mr. Schwedler, of Berlin, himself an undisputedly scientific engineer.

When you say that thorough experiments on rivet connections and girders of practical construction have been made on the continent, all depends on what you term thorough.

I am pretty familiar with this subject, and especially with the literature of Germany; but except some experiments on the shape of rivet-heads and friction of rivets, two experiments on girders made by Morin, and a few experiments on the flat-bar lattice, none are known to me. These are entirely insufficient to endorse lattice bridge and similar constructions.

If I have exposed German ultra-theorists, I have expressly excluded men like Ritter, Culmann, Sternberg and others, all of whom have made some tangible addition to the understanding of bridge design; executive engineers like Woehler, Koepke, Schwedler of course being highly appreciated. I have pointed exclusively at those who, filled with their theoretical wisdom and with the excellency of their judgment, without having contributed anything essential in theory or practice, are the foremost in attacking others and even in speaking contemptuously of the education of the engineers of a whole nation. Notwithstanding that the title pages of your books expressly read: "Lectures *delivered* at the Polytechnic School," you now state that you do not teach all that is contained in those books. There is then a contradiction, explained by the report which has reached my ears, that your scholars have rebelled against the study of those theories which, like your theory on earth pressure, are classified by you as of "*only scientific value.*"

It was no surprise to me when I learned that there are others who share my opinion. A European professor of engineering, interested in bridge-matters, has lately given me the honor of a call. Speaking of the great achievements in this country, without the slightest allusion on my part, he blamed the excessive theoretical direction of German professors, and pointed out two of them, one of whom was Prof. Winkler. Thereupon I showed him my reply to you, with which, in the most emphatic terms, he agreed, as expressing his own views to the letter.

Finally, I shall say that I decline to be guided by the remarks at the end of your letter; that I shall continue to expose the evil results of hyper-theoretical technical studies, and to advise young Americans not to enter similar lectures until at least they have collected so much practical knowledge that they may judge for themselves whom to hear and what part of the lectures to throw aside.

Yours truly, C. BENDER.

What is a Civil Engineer?

TO THE EDITOR OF THE RAILROAD GAZETTE:

There seems to be doubt as to the meaning of the words engineer and civil engineer, which on your part is summed up in your answer to "Archimedes S. Watt," in the following:

"Our correspondent's remarks about master mechanics coming forward and putting their shoulders to the wheels, or in other words of becoming members of the Society of Civil Engineers, suggests the idea that if it is considered desirable to have those who *are not* civil engineers members of that Society, it would be well to drop the distinctive word "civil" from the title which *we know* now excludes some of the most able mechanical engineers in the country from allowing their names to be submitted for election to membership in that Society. No change in the constitution is needed, as that instrument now permits the admission of engineers of all classes."

On this account I have investigated the subject, and submit the following definitions of the two words. The first is from the "Encyclopædia Britannica," third edition, 1798, which is the oldest definition I find:

"*Engineer*—in the military art an able, expert man, who, by a perfect knowledge in mathematics, delineates upon paper, or marks upon the ground, all sorts of forts and other works proper for offence and defence. He should understand the art of fortification, so as to be able, not only to discover the defects of a place, but to find a remedy proper for them; as also how to make an attack upon as well as to defend the place."

From Brande's Dictionary of Science, Literature and Art we have:

"*Engineering.*—Strictly the art of managing engines; but latterly applied in a more extended sense, not only to that art, but to all manufacturing and building operations in which engines are used. It is divided into *two branches, military* and *civil.*"

The definition of military engineering differs but little from the preceding:

"*Civil engineering*, as its name imports, does not include those branches above named which specially belong to the art of war; but relates to the forming of roads and bridges, railroads, the construction of machinery for all purposes, the formation of canals, aqueducts, harbors, drainage of a country, etc."

The rest of the definition is a condensation of Tredgold's description of a civil engineer, which was given under the following circumstances:

"On December 29, 1828, the council of the Institution of Civil Engineers (London) desiring an act of incorporation—

"*Resolved*, That Mr. Tredgold be written to, requesting him to define the objects of the Institution of Civil Engineers, and to give a description of what a Civil Engineer is, in order that this description and these objects may be embodied in a petition to the Attorney-General in application for a Charter.

"At the following meeting of the council on Jan. 4, 1828, the Secretary read the communication from Mr. Tredgold, which is thus entered in the minutes:

"DESCRIPTION OF A CIVIL ENGINEER, BY THOMAS TREDGOLD, HON. M. INST. C. E.

"'Civil Engineering is the art of directing the great sources of power in nature for the use and convenience of man; being that practical application of the most important principles of natural philosophy which has, in a considerable degree, realized the anticipations of Bacon, and changed the aspect and state of affairs in the whole world. The most important object of Civil Engineering is to improve the means of production and traffic in States, both for external and internal trade. It is applied in the construction and management of roads, bridges, railroads, aqueducts, canals, river intercourse, docks and storehouses for the convenience of internal intercourse and exchange; and in the construction of ports, harbors, moles, breakwaters andlighthouses; and in the navigation by artificial power for purposes of commerce.

"'Besides these great objects of individual and national interest, it is applied to the protection of property where natural power as the sources of injury, as by embankments for a defense of tracts of country from the encroachments of the sea or the overflowing of rivers; it also directs the means of applying streams and rivers to use, either as powers to work machines, or as supplies for the use of cities and towns, or for irrigation, as well as the means of removing noxious accumulations, as by the drainage of towns and districts to prevent the formation of malaria and secure the public health.

"'This is, however, only a brief sketch of the objects of civil engineering, the real extent to which it may be applied is only limited by the progress of science; its scope and utility will be increased with every discovery in philosophy, and its resources with every invention in mechanical or chemical art, since its bounds are unlimited and equally so must be the researches of its professors.

"'The enterprising Hollanders toward the close of the sixteenth century first separated civil engineering from architecture, under the title of hydraulic architecture; their example was followed in France toward the end of the seventeenth century, and soon afterward was systematized in the great work of Belidor on Hydraulic Architecture.

"'One of the great bases on which the practice of civil engineering is founded is the science of hydraulics; every kingdom, every province, every town has its wants, which call for more or less acquaintance with this science. Water, which is at once the most useful of the necessaries of life and the most dangerous element in excess, when limited by the laws of this science is rendered the best of servants; the rolling cataract which spends its powers in idleness may be directed to drain the mine, to break the ore, or be employed in other works of labor for the use of man; the streams are collected and confined in canals for inland traffic, harbors are formed to still the raging of the waves of the ocean and offer a safe retreat to the storm-driven mariner; and ports are provided with docks, to receive the riches of the world in security; hence arose the term 'hydraulic architecture.' But it was too limited; the various applications of water had rendered the natural supplies inadequate to the wants of man, till he discovered that, combined with heat, it formed a gaseous element endued with energies not less powerful than the falling cataract; its steam confined and directed by science became a new source of power, which in a few years altered and improved the condition of Britain, and we are every day witnessing new applications, as well as the extension of the older ones to every part of the globe.'

"From which is derived the definition of the Institution of Civil Engineers, viz.:

"'The art of directing the great sources of power in nature for the use and convenience of man; as the means of production and of traffic in states, both for external and internal trade; as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks, for internal intercourse and exchange; and in the construction of ports, harbors, moles, breakwaters and lighthouses; and in the art of navigation by artificial power, for the purposes of commerce; and in the construction and adaptation of machinery; and in the drainage of cities and towns.'"

In the Society of Civil Engineers (English), sometimes called the Smeatonian Society (which was, I believe, the progenitor of the present Institution of Civil Engineers), whose first meeting was held in London, April 15, 1793, 24 per cent. of its members, including Boulton and Watt, were in no sense of the word constructors of "*fixed* public works."

Crisy, in the preface to his Dictionary of Civil Engineering, puts it much stronger, saying:

"In England the profession of the civil engineer was scarcely known until the middle of the last century, when the important discovery of the application of steam by James Watt and its rapid development called into existence a new class of *mechanics* who gave fresh impulses to manufactures by the improvement of all kinds of machinery."

Worcester's Dictionary says under the heading "Engineering:"

"Civil engineering—the art of forming, or the construction of, roads, bridges, railroads; the construction of machinery for all purposes; the formation of canals, aqueducts, harbors, docks, drainage of lands, etc."

Webster gives:

"*Engineer*—A person skilled in the principles and practice of engineering, either civil or military.

"*Civil Engineer*—A person skilled in the science of, who designs or superintends the construction of public works or machinery. (See engineering.)

"*Engineering*—The science and art of utilizing the forces and materials of nature.

"In a comprehensive sense, engineering includes *architecture* as a mechanical art, in distinction from architecture as a fine art; *chemistry* as applied in connection with applied mechanics; *transportation*, including the building and propulsion of ships and other vehicles, docks, roads, bridges, canals and public works generally; *defense* and *offense* in the military and naval sense; *water-works; gas lighting;* the *preparation of materials; machinery; manufacturing*, etc.

"It is divided into *military* and *civil engineering*, the former being, strictly, the science and art of designing and constructing defensive and offensive works, while *civil engineering* is the science and art of designing and constructing machinery and public works, such as roads and canals. Civil engineering refers, according to modern usage, strictly to the construction of *fixed* public works, such as railways, canals, aqueducts, bridges, lighthouses, docks, embankments, breakwaters, dams, sewers, tunnels, etc. *Mechanical engineering* refers strictly to machinery, such as steam engines, machine tools, mill work, etc. *Engineering* is further divided into steam engineering, hydraulic engineering, gas engineering, agricultural engineering, topographical engineering, etc."

From the Cyclopædia of Useful Arts, edited by Charles Tomlinson, we have:

"Engineer and Engineering—Engineer is a term applied to those who are employed in devising or forming engines or machines, and in directing their applications. The duties of the engineer are divided into *military* and *civil.*" [Here follows a definition of military engineering]. "Military engineering will not occupy our attention in this work; but the various important branches and ramifications of civil engineering will be considered under their respective heads. The profession of civil engineer, as defined in the charter of incorporation of the

Institution of Civil Engineers, London, is" [Here follows the definition given above].

"Civil engineering is both a science and an art. As a *science* it includes the general principles of mechanics and construction; shows how we may ascertain the strains to which a structure is exposed; the dimensions and proportions which should be given to its several parts, so as to be able to resist such strains without injury. As an *art* civil engineering shows how scientific principles may be applied to the construction of works and how used and modified so as to meet the difficulties which constantly arise in practice."

This is followed by a "Synopsis of the Science of Civil Engineering," viz.:

"I. Mensuration. II. General Construction. III. Mechanics, or Construction of Machinery. IV. Special Construction. V. Hydraulic Engineering."

I think that the above extracts show that Webster's Dictionary has small warrant for asserting that civil engineering refers strictly to the construction of fixed public works, and that while the greater includes the less, the word civil should not be dropped from the title of the American Society of Civil Engineers; or if it is dropped, it should be at the suggestion of the military engineers of the country, who so far do not seem to object to it. N.

Some comments on the above communication will be found on our editorial page.

Curved Outlines in Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Some months ago you commented upon the use of curved outlines in the casings and other finish above the windows of passenger cars and in similar places. What you said was strictly true; and let me add to it a word, what I have long felt, that if our car-builders will insist upon these curved outlines, they will find that a decidedly better effect is produced by using a true half-ellipse above the window in place of the three-centred curve which is so common.

A curved line, when used for any such purpose, is much more pleasing, even to an untrained eye, when drawn with absolute mathematical or theoretical exactness, than when it follows in its outline no precise or particular law, and this is probably truer of the ellipse than of any other curve.

Any text-book will show how to draw an exact ellipse with a pencil, a string and two pins, when the length and width are given of the space to be occupied.

I agree with you that all such curved work, in our cars, drawn as it so often is, too, with incorrect and hence inelegant outlines, had better, by far, be abandoned for economy's sake; but, until our car-builders see their way clear to giving it up they ought, for the credit of their own art, to give us correct outlines, which in themselves are pleasing things even in the commonest material.

A score of such points of detail could be enumerated—some of them, it is true, being mere matters of individual taste; but in many of them it is safe to say that some economy could be effected by keeping more closely within the limit of strict correctness of principle in the construction and ornamentation of the work. HARD WOOD.

Locomotive Tests on the Boston & Albany.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of August 4, a communication is published relating to the comparative merits of Mogul and eight-wheeled standard locomotives, as evinced by a trial on the Boston & Albany Railroad for five days ending June 21.

Notwithstanding the lack of interesting details concerning this trial, as you have observed in the editorial foot-note, and the clumsy handling of figures in a table made so as to show the "cost per mile" at from $16.58 to $21.38, or a saving in favor of the "Virginia" of the enormous sum of $4.80 per mile, said figures being all 100 times too large, the writer goes on to say, "demonstrating conclusively the great superiority of the 'Virginia' over the Mogul engine 'Brown.'"

Concerning this assertion I think it would be better to withhold judgment entirely until the completion of the experiments now being continued on the eastern end of the Boston & Albany Railroad between the same Mogul "Brown" and another eight-wheeled engine, the "Adirondac" taking the place of the "Virginia." Railway men will of course await the result of these trials with considerable attention, the conditions of the Mogul "Brown" in the former trial not being such as to authorize the conclusiveness of the former account. R.

ANNUAL REPORTS.

Chicago & Northwestern.

The annual report is for the year ending with May, 1876. At its close the mileage worked was precisely the same as for the previous year, but a correction in the length of the line between Belvidere and Madison makes the mileage reported 1.3 miles longer, on 1,992.08 miles, divided as follows:

Chicago & Northwestern.	
Chicago & Northwestern and branches (consolidated)	*1,059.30
Chicago & Milwaukee (owned but not consolidated)	85.00
Chicago, Iowa & Nebraska and Cedar Rapids & Missouri River (Clinton, Ia., to Council Bluffs, leased perpetually)	356.60
Total Chicago & Northwestern	1,500.90
Proprietary roads.	
Winona & St. Peter and Mankato Branch	330.75
Lacrosse, Trempeleau & Prescott	29.00
Iowa Midland	68.80
Northwestern Union	62.63
Total Proprietary roads	491.18

The Chicago & Northwestern, we believe, owns *all* the stock of the companies which own the proprietary roads, and has guaranteed all or nearly all their bonds. It is thus practically the owner of them all. Their position is such, however, as to modify materially the security of the bonds. The mortgages issued by the Chicago & Northwestern are secured by its roads, and any failure to pay interest on them would render them liable to foreclosure. The bonds of the "proprietary" roads, which are guaranteed by the Chicago & Northwestern, are secured only by the proprietary roads themselves. In case of default, they would form a floating debt, not a mortgage debt, of the Chicago & Northwestern. So far as Chicago & Northwestern stockholders are concerned, the bonds of the proprietary roads stand between them and dividends just as much as any bonds of the Chicago & Northwestern itself, however.

*The 30 miles of double track between Chicago and Turner Junction are connected as two roads.

The equipment at the close of the year consisted of 342 locomotives (1 to 5.82 miles of road); 142 first-class, 29 second-class passenger cars, 65 baggage and express and 15 mail cars (251 passenger-train cars); 140 caboose and way, 4,273 box, 1,025 platform, 1,957 iron ore and 454 stock cars (7,849 freight-train cars); 4 officers' and business cars, 18 boarding cars, 26 dump cars for road work, 40 ditching cars and 12 pile-driving and wrecking cars (100 service cars). The Winona & St. Peter Railroad Company owns in its own name 27 locomotives, 9 passenger train and 1,028 freight-tain cars. The whole stock is thus 369 locomotives (0.185 per mile of road) and 9,237 cars of all kinds (4.637 per mile of road).

The company has moreover a land grant, in Michigan, Wisconsin, Minnesota and Dakota whereof 2,155,560 acres remain unsold, It sells very slowly. The sales during the last year were 19,457 acres at an average price of $2.96 an acre. The land grant in Minnesota is in the western part of the State, where the Government land is still open for settlement on homestead claims; and the other land is chiefly not agricultural.

The other property owned by the company consists chiefly of the proprietary roads, which are charged in the general account at $2,721,879.73; and in sundry securities charged at $302,651.09, besides the usual working stock of supplies, amounting to $1,326,975.83.

This property is represented by

Capital stock:		
Common	$15,011,180 40	
Preferred	21,502,233 42	
		$36,513,413 82
Funded debt:		
C. & N. W. currency bonds	$12,900,000 00	
Chicago & Milwaukee bonds	1,700,000 00	
C. & N. W. gold bonds	16,433,000 00	
		31,033,000 00
Real estate mortgages		255,000 00
Due Northwestern Union Railway		168,155 30
Floating debt less floating assets		734,204 68
Balance at close of year		3,817,329 53
Total		$72,521,103 33

Per mile of road owned, the common stock is $13,118; the preferred, $18,792; the funded debt, $27,120; the real estate mortgages, $223, for the 1,144.3 miles of road owned directly, or $59,030. This includes the property in the proprietary roads owned by the company—that is, the value of their stock, which the Chicago & Northwestern owns.

The funded debt of the proprietary roads (guaranteed by the Chicago & Northwestern) amounts to $14,625,000, and is at the average rate of $29,775 per mile of those roads.

The entire funded debt for which the company is liable consists of:

	Principal.	Interest.
Gold 7s	$24,308,000	$1,701,560†
Currency 7s	19,000,000	1,330,000
Currency 8s	1,350,000	108,000
Currency 10s	1,000,000	100,000
	$45,658,000	$3,452,255

This debt is at the rate of $27,917 per mile of road owned (including all but the leased line across Iowa), and the interest charge at the rate of $2,111 (currency) per mile.

The additions to construction and equipment accounts during the year amounted to $1,300,981, and in part payment of these $825,000 of the general consolidated gold bonds were issued.

The work of the year on the entire 1,992 miles (now worked under a single management) was:

	1875-76.	1874-75.	Increase.	P. c.
Train miles—				
Passenger	2,573,777	2,491,956	81,821	3.3
Freight	4,636,517	4,589,081	47,436	1.9
Service	2,710,861	2,491,857	219,004	8 8
Total	9,921,155	9,572,894	348,261	3.6
Passengers carried	3,527,143	3,407,620	119,523	3.5
Passenger mileage	122,281,308	116,775,354	5,505,954	4.7
Tons carried	3,471,927	3,153,315	318 612	10.1
Tonnage mileage	503,132,389	454,546,468	48,585,921	10.7

The increase in train mileage has been less than the increase in traffic, due to an increase in the average passenger-train load from 46.9 to 47.5 passengers, and in the average freight-train load from 99 to 108⅛ tons of freight.

The earnings and expenses of the entire system (1,992 miles were:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Gross earnings	$14,013,731 97	$13,786,303 08	Inc.. $227,428 89	1.65
Expenses and taxes.	8,274,289 90	8,781,267 13	Dec.. 506,977 23	5.77
Net earnings	$5,739,442 07	$5,005,035 95	$734,406 92	14 67
Per mile—				
Earnings	7,035	6,921	Inc.. 114	1.6
Expenses	4,154	4,408	Dec.. 254	5.8
Net earnings	2,881	2,513	Inc.. 368	14.7
Per c't. of expens's	59.05	63.69	Dec.. 4.64	....

These figures are obtained from those given separately for the Chicago & Northwestern proper and the proprietary roads in the report.

The operations of the 1,500.9 miles of the Chicago & Northwestern and leased roads are reported as follows:

Earnings:	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers	$3,145,749 63	$3,205,059 68	Dec.. $59,310 05	1.9
Freight	9,001,177 95	8,837,828 49	Inc.. 163,349 46	1.9
Express	262,253 83	268,284 46	Dec.. 6,030 63	2.2
Mails	289,182 98	264,459 33	Inc.. 24,723 65	9.3
Miscellaneous	75,346 96	132,094 55	Dec.. 56,747 59	43.0
Total	$12,773,711 35	$12,707,726 51	Inc.. $65,984 84	0.5
Expenses:				
Working	7,084,617 95	7,557,693 14	Dec.. 483,075 19	6.4
Taxes	327,546 90	408,737 14	Dec.. 81,190 24	19.8
Renew'ls, etc., account of Chicago fire	6,693 14	18,264 27	Dec.. 11,571 13	63.3
Total	$7,408,857 99	$7,984,694 55	Dec.. $575,836 56	7.2
Net earnings	5,364,853 36	4,723,031 96	Inc.. $641,821 40	13.6
Per mile:				
Gross earn'gs	8,510	8,466	Inc.. 44	0.5
Expenses	4,936	5,320	Dec.. 384	7.2
Net earnings.	3,574	3,146	Inc.. 428	13.6
Per cent. of expenses	58.00	62.84	Dec.. 4.84	....

The gross receipts and receipts per mile of the proprietary roads were:

	Gross receipts. 1875-76	Gross receipts. 1874-75.	Receipts per mile. 1875-76.	Receipts per mile. 1874-75.
Winona & St. Peter	$626,965 83	$558,504 14	$1,917	$1,708
Winona, Mankato & New Ulm	4,187 18	3,998 65	1,117	1,066
La Crosse, Trempeleau & Prescott	231,966 95	201,003 06	7,999	6,931

†Reduced to currency in the total at 112½ as the price of gold.

	Gross receipts. 1875-76.	Gross receipts. 1874-75.	Receipts per mile. 1875-76.	Receipts per mile. 1874-75.
Iowa Midland	108,366 63	88,516 50	1,575	1,287
North western Union	268,534 03	226,554 22	4,283	3,617
Total	$1,240,020 62	$1,078,576 57	$2,524	$2,197
Expenses	865,431 91	796,572 58	1,766	1,626
Net earnings	374,588 71	282,003 99	764	576

Thus the increase in the receipts extends to every one of these lines, and amounts on the whole to 15 per cent. Their expenses meanwhile were larger by 8½ per cent., leaving an increase of 32⅔ per cent. in net earnings, which amounts to $92,585 in all, or $188 per mile of road.

The chief payments from the total net earnings of $5,739,442 were:

Interest	$3,520,700 50
Rentals	1,142,645 53
Sinking fund	40,120 00

About $1,301,000 was expended for new construction and equipment during the year, most of which was provided for by sales of general consolidated bonds. The balance to credit of income reported was $1,179,716.89 greater at the end than at the beginning of the year.

From the report of the President, Mr. Albert Keep, the following paragraphs are extracted:

"The gross earnings of the fiscal year furnish no adequate indication of the amount of traffic as compared with the previous year. They rather show the constant progress and increasing development of the country tributary to our lines. Additional business has come in to more than make up for any deficiencies occasioned by the prevailing low rates of transportation. The descending scale in prices during the year was met by an ascending volume of traffic, and by greatly reduced operating expenses, producing results which have added to the net profits of the company, and are encouraging for the future of the property.

"Had the prices of the year previous been obtained on the business of the last year, the gross earnings would have been $942,048.88 greater than they were, of which earnings, $299,248.08 would have accrued from passengers and $732,800.80 from freight.

"A gratifying feature is the improvement which has taken place in the business of the newer lines. The Proprietary roads, as a class, have increased their traffic in much more rapid ratio than the parent road, although a steady and healthy growth has continued with the latter.

"The increase in tonnage carried one mile on the Chicago & North-western Railway was 10.08 per cent.; on the Winona & St. Peter, 18.88 per cent.; on the La Crosse, Trempeleau & Prescott, 18.67 per cent.; on the Northwestern Union, 24.55 per cent.; and on the Iowa Midland Railway, 26.95 per cent."

* * * * *

"The saving, thus effected, [in expenses] has not been made at the expense of the property, but is the result of careful efforts extending through every department of operating, and is the fruit of better facilities afforded by the completion of the new shops, by steel track, and important improvements in permanent way.

"The road and rolling stock have been fully maintained, and are in good condition at the close of the year. Besides the renewals with steel rails, extensive repairs and improvements have been made in the track, bridges, culverts and roadway."

* * * * * * *

"There has been expended upon the company's new shop improvements, including buildings, machinery, appurtenances, and shop grounds (comprising 240 acres) at West Chicago, during the past year, the sum of $289,484.61, and upon the property, from the beginning in 1873 up to the close of the fiscal year, the sum of $1,196,241.62. The works are of great extent and of the most durable character, and have been conveniently and carefully constructed, with due regard to promoting economy of labor, and providing facilities which shall be ample for the growing wants of the company in this important department of its service.

"Nine new and substantial shop buildings of brick and stone, of various classes, covering nearly 3¼ acres, have been erected during the year, viz.:

A two-story shop, for wood-working machinery	80×308 ft.
Engine room, 21×38; boiler room, 28×36; tank, 24 feet diameter and 16 feet deep.	
A blacksmith's shop for car work and working tools	80×308 ft.
Two buildings, with transfer table between, for building and setting up cars	each 80×302 ft.
One shop, with transfer table, for painting cars	80×302 ft.
A general warehouse of two stories, for storage of materials and supplies	50×300 ft.
A two-story oil house	50× 50 ft.

"These buildings are all heated by steam, are supplied with water tanks, steam pumps, hydrants and pipes connected with local artesian wells and with the city mains, for greater security against fire."

* * * * * *

"As one of the indispensable conditions of prosperity, the company is actively engaged in reconstructing its principal tracks with steel rails, and the work is progressing as fast as renewals of the present track are required, and it can be done with economy in the operation of the road.

"The number of miles laid during the year was 116.85, making a total of 440.20 miles of steel track in use at the close of the last fiscal year.

"Contracts for 15,000 tons American steel rails, payable with one ton of old rails for each ton of steel, and the balance in cash, were made last winter for summer and fall delivery; these rails will be laid as received during the present year."

"It should be stated, however, that the law of Minnesota, fixing maximum rates of fare and freight, has been repealed, and the Potter law in Wisconsin superseded by an act restoring to the railroads the right to charge the maximum rates which were in force by tariffs of the Milwaukee & St. Paul Railroad in 1872. The rates charged under this act are for the most part lower than the maximum, and are generally satisfactory.

"The financial affairs of the company, as well as the material condition of the property, have been much improved by the operations of the last fiscal year.

"The floating debt has been reduced $1,087,701.26, and the diminished amount which appears on the balance sheet at the close of the year, in excess of the ordinary monthly accounts for working the road, will be rapidly liquidated.

"There was a very considerable increase in the amount of business done over that of former years, and the revenue resulting therefrom was sufficient to augment the gross earnings on all the lines; while, at the same time, there was a reduction in working expenses of a little more than half a million of dollars, accomplished without detriment to the service, or deterioration of the property.

"The net income for the year, after deducting all charges, was $1,179,716.89, against $518,266.38 the preceding year, and is equivalent to 5½ per cent. on the preferred stock of the company. This result, obtained during a year of general depression in business and low prices for transportation, may be regarded as propitious to the interests of stockholders, and encouraging for the future."

—Mr. Frank J. Hecker has resigned his position as General Superintendent of the Rhinebeck & Connecticut and the Ulster & Delaware roads, to accept a similar one on the Detroit, Eel River and Illinois. He has been connected with the Ulster & Delaware since its first organization as the Rondout & Oswego in 1870, and with the Rhinebeck & Connecticut since 1875.

RAILROAD GAZETTE

Published Every Saturday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS:

Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

THE CHICAGO & NORTHWESTERN.

This company works an immense system of railroads—something like a real system, the different parts forming a somewhat homogeneous whole, all serving to connect the territory west of Lake Michigan and south of Lake Superior with Chicago and the rail and water routes thence to the East. It penetrates most parts of the quadrant northwest of Chicago, beginning on the south with a line nearly due west to Omaha, with branches between that and the next great line from Chicago northwest entirely across Wisconsin and Minnesota and penetrating Dakota, to a point more than 600 miles from Chicago, and with still another long line from Chicago north by west to Green Bay and Lake Superior, which for about 150 miles south of Fond-du-Lac is a loop; while a connection with a friendly company gives it one of the two leading routes between Chicago and St. Paul, and there are many branches which feed these main lines.

The company's title to the roads which it works (nearly two thousand miles in all) is not complex, though not so simple as to prevent misunderstanding in some minds. A large number of its newer lines, termed "proprietary roads" in the company's report, are not formally the property of the Chicago & Northwestern Company. But as that company owns all their stock, it is benefited by all their profits, and as it has guaranteed all their bonds, it suffers by all their losses. These roads are really the property of the Chicago & Northwestern alone. They form altogether 491 miles of road in five different lines, one of which (the Winona & St. Peter) is 327 miles long. These roads are comparatively new, and only one or two of the shorter ones have a remunerative traffic. Altogether their net earnings have always been considerably less than the interest on the bonds issued on them (last year $617,800 less), so that this part of the system has been for the time a burden on the company; though they have drawn to its other lines a considerable traffic, the profit on which must have lessened this loss.

The only part of the system leased is that across Iowa from Clinton to Council Bluffs, 356.6 miles, which was leased at a high rental when it formed the sole connection with the Union Pacific. This rental has been modified since, but is still high.

Properly the mileage of the proprietary roads should be included in calculating the capital account per mile of road. On this basis we have, per mile owned:

Common stock	$9,178
Preferred stock	13,147
Currency bonds	13,054
Gold bonds	14,863
Real estate mortgage bonds	156
Total	$50,398

Of the currency bonds $1,000,000 bears 10 per cent., and $1,350,000 bears 8 per cent. interest, and the rest 7 per cent. All the gold bonds bear 7 per cent. The gold interest is at the rate of $1,010, and the currency interest $940 per mile. When gold is worth 112½, the total yearly interest on the funded debt is $3,452,255 currency, or $2,076 per mile. Now the net earnings for the last year were $2,881 on the whole system worked, or about 40 per cent. more than this interest charge.

If we take the interest and rentals from the net earnings of the year, we have left a balance of about $1,180,000 available for adding to the company's property or for division among its shareholders. It is equivalent to about 5½ per cent. on the preferred stock. The year, hard as the times have been, was in many respects favorable to this company. There was a large wheat crop in the country which it serves—a country whose chief crop is wheat—while the crop was comparatively light the previous year. Wheat bore a low price, and this made it necessary to accept lower rates than could have been obtained otherwise; while the "Potter law," which was in force part of the year, had some effect in diminishing earnings. The result of the year's working is quite similar to that of many Eastern roads. There was a notably greater traffic than the year before (chiefly freight) carried at rates so much lower that the gross receipts gained very little from the additional traffic; but there was a material reduction in expenses, so that the profits were a seventh more than the year before. More business; receipts about the same; expenses lighter; net earnings much greater.

A favorable symptom is the considerable increase in the earnings of the "proprietary roads." These have been a burden on the company so long that many of its shareholders, doubtless, have despaired of ever finding them a source of strength. The longest of these roads is very well placed, through a most fertile country, and it is not easy to see why it should not some day have as heavy an agricultural traffic as any of the company's roads in Iowa, Illinois or Wisconsin. Probably it will, though its progress has been slower than was expected.

The gross earnings, expenses and interest charge, and the excess of the latter over the former on these proprietary roads have been:

	Gross earnings.	Expenses and interest.	Deficit.
1872–73	$1,038,948	$1,354,235	$315,287
1873–74	1,280,413	1,837,085	556,672
1874–75	1,078,576	1,926,477	847,901
1875–76	1,240,020	1,857,854	617,834

The loss by these roads last year was equivalent to a dividend of a little less than 3 per cent. on the preferred stock. It will require average net earnings of $2,111 per mile on these roads to meet their annual interest charges. This is a comparatively small sum, but the net earnings last year (the largest in the history of these roads) were but 36½ per cent. of this amount, the gross earnings being but $2,524. With the last year's proportion of working expenses, the gross earnings should be about $7,000 per mile, in order to meet the interest and render these roads self-supporting.

The capital account of the Chicago & Northwestern proper has increased from 1866, when it had 925 miles of road, to 1876, when it had 1,501 (357 leased), from $41,000,000 to $75,000,000, and the funded debt from $14,000,000 to $31,000,000. The net earnings meanwhile increased from $2,716,756 in 1865–66 to $5,364,853. The net earnings of the company have been, for eleven years:

1865–66	$2,716,756	1871–72	$4,592,136
1866–67	3,057,742	1872–73	4,558,370
1867–68	4,751,199	1873–74	5,075,674
1868–69	5,016,823	1874–75	4,723,032
1869–70	4,522,110	1875–76	5,364,853
1870–71	5,383,408		

Thus the net earnings last year have been exceeded but twice in the history of the company, once in the flush times of 1868–69, when the materials for the Union Pacific passed over this line exclusively, while it had 1,156 miles of road, and again in 1870–71, when a trifle greater net earnings than last year were obtained with 1,224 miles of road. The losses incurred on the proprietary roads further reduce these net earnings in the later years.

The value of the stocks and the security of the bonds of this company, as of every other, depend upon the yearly surplus of net earnings above all fixed charges—including interest, rentals, and whatever else is expended without adding to the property of the company. This surplus for four years has been:

1872–73	$1,868,626
1873–74	1,355,081
1874–75	518,266
1875–76	1,179,717

The fixed charges during this period increased very largely, by the increase in the bonded debt for the construction of the new lines completed just about the time of the panic of 1873. These charges amounted to about $2,700,000 in the first of these years, and to nearly $4,200,000 in the last. There is hardly any of the new road that has become profitable as yet; though we have seen that the earnings of such as are separately reported (the proprietary roads) are increasing. Thus the company has been able to support these lines in their infancy and yet preserve a considerable surplus. The system of roads is now complete, and the future expenditures for construction will doubtless be confined to improvements of the road already built and to increasing its equipment, unless it is evident that the new line to be constructed or acquired will pay interest on its cost from the beginning. The dangers of the company have been greatly lessened of late years by the cessation of the bitter competition between it and the Chicago, Milwaukee & St. Paul. This competition was one of the chief causes of the construction of superfluous, non-paying lines in the territory served by these two companies; and so long as it existed it was likely to reduce the rates of transportation below what would be reasonable and otherwise practicable. But the difficulties of the times, and especially those imposed by the hostile legislation of Wisconsin, have apparently caused a spirit of harmony where formerly there was nothing but discord. If this disposition is maintained, both companies are likely to improve their position from year to year, as the districts which they serve grow in population and production. They are, it must be remembered, the chief outlets of the great wheat-growing State, Minnesota, and of a great part of Northern Iowa—districts where but a small fraction of the available cultivable lands are yet occupied, as well as of the older territories which now supply them with the larger part of their traffic. The danger which threatened a few years ago, that the traffic of these new districts would be rendered valueless by a great over-supply of railroads, is at least indefinitely postponed. Probably no considerable competitors will enter the field in Minnesota and Western Iowa until after the roads now there have become reasonably prosperous by themselves, without reference to their contributions of traffic to trunk lines this side of the Mississippi. The experience of Illinois and Eastern Iowa is not likely to be repeated further west and northwest, at least until the disastrous failure of the swarm of new railroads has been forgotten.

THE STATUS OF CIVIL ENGINEERS.

On another page will be found a letter from a correspondent in which an effort is made to define accurately the profession of civil engineering. As there seems to be a great deal of ambiguity about the meaning of the term, and as to the scope of the duties of a civil engineer, we will devote a little space to the discussion of the subject.

Doubtless in its *first* meaning the word *engineer*, or the word from which it was derived, was applied to persons in charge of the construction or management of engines of war; because a state of warfare always preceded civilization. When civil works were constructed, the persons in charge of them were called "civil engineers" to distinguish them from military engineers. Now, to quote from Herbert Spencer: "An aboriginal name, applied indiscriminately to each of an extensive and ill-defined class of things or actions, presently undergoes modifications by which the chief divisions of the class are expressed." Now this modification occurred when it was necessary to distinguish civil from military engineers. But, to quote from the same author again: "These several names springing from the primitive root, themselves became the parents of other names still further modified." Thus all language has gone and is still going through a process of evolution, or a transformation of the "homogeneous" into the "heterogeneous," as the scientific men state it. During the last thirty years, and since some of the defini ions quoted by our correspondent were written, this second stage of evolution in the art of engineering has been developed so that the old classification into military and civil is not adequate, and, by common usage, the term civil engineering is applied, as Webster states it, to "the construction of *fixed* public works." We also have mechanical engineers, mining engineers, gas engineers and, lately, sanitary engineers, and the present subdivisions of labor will undoubtedly make necessary still further subdivisions and terms to designate them.

The idea of our correspondent seems to be that the term civil engineer is generic, and comprehends all the species of engineers engaged on work which is not military. In reply to this, common usage may be quoted, and it may, we believe, be safely stated that if the question were asked whether our correspondent was a civil or mechanical engineer, not one person in ten, at all conversant about such matters, would for a moment be in doubt about the meaning of the inquiry; but it would at once be understood to mean whether he has been engaged in the construction of fixed works, such as railroads, docks, etc., or in designing and constructing machines.

It is also a fair presumption that the author of one of the two dictionaries which are accepted as authority in this country would have some definite knowledge of the *modern* usage of such a term as civil engineer. At one time, undoubtedly, as Worcester says, the term civil en-

gineering included the art of forming or the construction "of machinery for all purposes;" but owing to the process of evolution, both in the art and the science of engineering and the language which represents it, the term civil engineering, as Webster says, "refers, according to *modern usage*, strictly to the construction of fixed works."

In further evidence of this, it may be stated that Mahan's treatise on civil engineering treats of the following subjects, which are the heads of the different chapters: "Building Materials, Masonry, Framing, Bridges, Roads, Railways, Canals, Rivers and Sea-coast Improvements." Rankine's treatise on the same subject has the following headings for its chapters: Engineering Surveys, Earthwork, Foundations, Masonry, Carpentry, Metal Work, Roads, Railways, Canals, Rivers, Water-works, Harbors, etc."

In the introduction to the Elementary Treatise on Civil Engineering, by Henry Law, published in the old Weale series, a synopsis is given of the science of civil engineering which is too long to copy, but in which there is no reference to the construction of anything excepting fixed works, and he speaks of machines only as "machines *employed* in engineering." Trautwine's "Civil Engineer's Pocket-Book" also refers only to the construction of fixed works. The authors of these books, which are accepted as standard treatises on civil engineering, have ignored what has lately been called "dynamical engineering" entirely, showing that they did not consider that it was comprised under the titles of their books, or, in other words, that dynamical engineering was not civil engineering as that term is understood in modern usage.

In the Sheffield Scientific School there are professors of both civil and mechanical engineering, and in the programme of studies given in their annual catalogue they say "students are received who desire to qualify themselves for such professions and occupations as the following," among which are given:

"Civil Engineers—with reference to the construction of roads and bridges, aqueducts, reservoirs, drainage systems and public works in general.

"Mechanical Engineers—with reference to the superintendence of manufactories, the invention and construction of machinery, the application of steam, etc."

In the School of Mines of Columbia College there are two distinct courses, one of civil engineering and the other of mining engineering, and a different degree is conferred for each, although in this case the professorship of both civil and mining engineering is held by the same person.

In the Massachusetts Institute of Technology there are separate courses for civil, for mining and for mechanical engineering, and professors of each. The same thing is true in the Department of Science of the University of Pennsylvania, and also in Cornell University.

This shows conclusively, we think, that those who teach civil engineering, and those who have written the standard treatises on this subject understand civil engineering to be quite distinct from other kinds of engineering, and not in any sense a generic term which includes all the other branches of engineering excepting military.

It may be thought that this is a dispute merely about the meaning of words, which in one sense is true; but it is because the words themselves represent an erroneous idea, which we believe sometimes leads to evil results, that it seems important that the meaning of the words should be made more precise. The error referred to is expressed in an address made by a civil engineer at a meeting of the Society with that title, in which he spoke "of the American Society of—not merely hydraulic, not merely mechanical, not merely railroad or topographical or bridge engineers, but of that which includes all these—of Civil Engineers."

Now this means, either that all these classes are civil engineers as distinguished from military engineers—a meaning of the term which has passed out of use—or else that a civil engineer is a hydraulic, a mechanical, a railroad, a topographical and a bridge engineer all in one. Our protest is against the assumption that a civil engineer is *all kinds* of an engineer, and competent to direct and give advice about all sorts of engineering work not military; whereas mechanical, mining, sanitary and other engineers' duties and knowledge confine them to the comparatively narrow field which is their specialty. It is because some civil engineers assume an attitude of superiority that we feel disposed to question the meaning of their title and the extent of the knowledge which it covers.

There can be no reason whatsoever why a man who knows how to build a dam, locate a railroad or drain a city should therefore know how to design a marine engine or superintend the working of a coal mine. Because an engineer knows all about hydraulic cement, it does not follow that he can design the strongest arrangement of rivets for the seam of a boiler. He might be competent to build the best kind of a masonry bridge, and yet be utterly imbecile in the construction of iron bridges. A man might have the eye of an eagle, be as shrewd as a fox and as correct as mathematics in locating a railroad, and yet do nothing but blunder if he be undertook to design a compound engine to work steam with the highest economy. Engineering art and science are now so extended, involve such vast and varied fields of knowledge and experience, that no human being can hope to become thorough master of more than one or two branches. It is admitted that, as a class, what are called civil engineers are generally more highly cultivated and perhaps belong to a higher social plane than the representative of other branches of engineering, but that a person whose training and experience have been in the construction of fixed works either acquires or requires any wider range of knowledge, any clearer apprehension of facts or comprehension of causes and results than an equally extended experience in mining or mechanical engineering would give, is utterly denied. The process of reasoning which some seem to employ is this: "Civil engineering is 'the art of directing the great sources of power in nature for the use and convenience of man.' *We* are civil engineers; therefore *we* are capable of directing the great sources of power in nature," etc., etc. This is like the celebrated resolutions that, first, the earth is the possession of the saints; second, that we are the saints.

It certainly would be a great act of folly to underestimate the value of knowledge possessed and required by civil engineers in the construction of fixed works, which is usually of a very varied character, and in the correctness of which and the conclusions deduced therefrom, the gain or loss of large amounts of money often depend. Our protest is against the assumption of knowledge of subjects of which they are ignorant, and the inference that because they know about one class of things therefore they are acquainted with all others.

Probably the world would be benefited if the words *engineer* and *engineering* were abolished. There are, perhaps, few others so vague and inexact. They cover vast mountains of humbug and incompetency. As there are no other words, apparently, to take their places, and no authority to enforce their use if there were, there is no alternative except to continue their use. The only way to give them greater precision is by the addition of some limiting words. The present method of doing this seems to be incorrect; for example, if we paraphrase the term dynamic engineer, we have an engineer relating to dynamics, and a sanitary engineer, an engineer pertaining to health. It would be much clearer and more accurate to say an engineer of sanitary works. This would be capable of very extended application. Thus we would have engineers of docks, engineers of water works, of railroad equipment, of machinists' tools, of coal mines, of iron metallurgy, of pumping machinery, of masonry, and many other specialities whose number is increasing and will continue to increase very rapidly. This would avoid the liability to which the public is now prone, of going for advice about one thing to a person whose knowledge refers entirely to another, or of falling into such errors as asking for designs and placing the construction of an iron bridge in charge of a person whose whole experience and knowledge were derived from constructing bridges of stone, or *vice versa*, or of advising with another engaged exclusively in constructing hydraulic works about the manufacture of rails. By calling one an engineer of iron bridges, the other engineer of masonry bridges, we would state clearly the special knowledge which they possessed. At any rate the sooner some more exact designation of the different classes of engineers comes into use the better it will be for the members of that profession and the public at large.

Railroad Securities and the Railroad War.

It is now about four months that the trunk lines have been carrying most of their through traffic at extremely low rates, such as never were known before. The contest of the previous year had shown that great losses result from such rates, but it had also shown that the stronger trunk lines can suffer great losses on through traffic and still make profits enough for a good dividend, though all had a smaller surplus than the previous year.

The depression in rates has been greater this year, but the business in some lines has been considerably greater. Whether a large business is desirable of course depends upon whether there is a profit on it. It is probable that, on some of the roads at least, much of the traffic taken at current through rates results in a loss instead of a profit; and of course, with work of this kind, the more a railroad carries the worse it is off.

The effect of such a contest should be reflected in the prices of railroad securities, and especially in the prices of their shares, which are first to suffer by any losses.

When the railroad war began, the trunk lines had had a few months of comparative harmony, and, for the time, decided prosperity. The winter business had been fair in amount and for the most part was done for remunerative prices. This doubtless had had an influence in strengthening stocks. On the other hand, there had been a bitter and disastrous struggle during one half of the preceding year, and there was a prevailing feeling that the peace might not last, and this doubtless prevented prices from rising as high as they would have been had there been confidence that the railroads would make the best of their situation.

An examination of the quotations for the leading securities of the lines most affected by the low through rates, as given just before the reduction and at the present time, shows what has been the appreciation of the effect of the railroad war among investors in railroad securities.

Although railroad companies are no more desirous than individuals to make known any financial weakness which they may suffer, they are not usually so well able to conceal it. Usually a company has in its service a considerable number of men who have made large investments in its securities and are in position to know if it is losing money. Should the company be seriously weakened, they are pretty sure to sell out some part of their securities before the weakness is generally known; and sooner or later such sales become known and other investors take their cue from them. That is, except in speculative stocks, the market price is largely fixed by those who best know their value, as is the case with most other things in the world. An examination of the prices current before the reduction in rates (most of them April 20) and at this time shows a considerable fall in almost all stocks of trunk lines, but generally very little difference in the prices of bonds. Thus the investing public apparently does not apprehend that the security of the mortgage debts of the railroads has been or will be affected by the low rates. The quotations for shares at the two dates are as follows:

	April.	August.
New York Central & Hudson River	112⅝	106
Lake Shore & Michigan	55½	54
Michigan Central	53½	43
Erie	15½	13½
Pennsylvania	54½	49⅞
Baltimore & Ohio	171½	157

The proportion of reduction is not so irregular as appears, the percentages being: New York Central, 6 per cent. (nearly); Lake Shore, 3 per cent. (nearly); Michigan Central, 19 per cent.; Erie, 13 per cent.; Pennsylvania, 10 per cent.; Baltimore & Ohio, 8½ per cent.

The reduction in the market value of the stocks of these companies, caused by the fall in prices here noted, amounts to:

New York Central	$5,924,625
Lake Shore	750,000
Michigan Central	1,897,243
Erie	1,560,000
Pennsylvania	3,071,773
Baltimore & Ohio	1,905,880
Total	$15,109,521

This is an average reduction of nearly five dollars per $100 share of these companies, which is of course more than any of them could have earned for division in this space of time. This, however, is the common effect of any loss in earnings. The failure to pay a dividend causes the fear that the property is permanently weakened, and that the company may continue to pass dividends.

The stockholders of the trunk lines may thus be said to be fifteen million dollars poorer than when rates were reduced last April. That they are so much poorer because of that reduction, it is impossible to affirm, though the tendency of solid securities has been upward since that time. United States fives which brought 118¼ April 20 are quoted at 119½ August 15; Chicago, Burlington & Quincy stock was then 117¾, is now 119¾. Apparently the securities of the trunk lines should have at least held their own, but for the railroad war.

Technical Convention of the German Railroad Union.

This convention of the technical officers—that is, officers engaged in the operating, road and rolling stock departments—of the railroads belonging to the German Railroad Union, met in Constance on the 26th, 27th and 28th of June last. Of the 108 companies belonging to the Union 64 were represented by 96 delegates. There was nearly an equal number present from the three departments of construction, operation and rolling stock.

The first business of the convention was the revision of the "technical regulations" of the Union, which were published in the *Railroad Gazette* about three years ago. Special attention was given to a motion of a Bavarian Superintendent of Machinery concerning the construction of stronger draw-hooks and screw couplings, all of their dimensions being based on a number of experiments which had been made in both Vienna and Munich. The convention also, by a majority which approached unanimity, agreed to a resolution that the safety chains, heretofore prescribed as indispensable, may be dispensed with, because they have not proved effective in preventing the breaking in two of trains. This is the chief object of those chains in Europe, where no trucks are used, and the chains serve chiefly as a sort of supplementary coupling. Railroad men in Germany have long recognized it as a fact that when the couplings gave way, the safety chains fail immediately; but no authoritative expression of this conviction had been made heretofore. The use of these chains is prescribed by the "road regulations" of the German Empire; but it is hoped that these will be altered in accordance with the resolution, connected with which was one requiring every train or car to carry material by which a train which breaks in two may be re-united.

Another important subject for consideration was the modification of the regulations for the construction of secondary railroads.

A third subject was the cutting out of cars or groups of cars

while switching with a locomotive, and letting them run. The resolution passed says that this practice seems not only permissible but indispensable wherever a great traffic is to be handled. To prevent injury to the men and the cars it was recommended that the ordering of the cutting off and running out should be entrusted only to an experienced yardmaster, and that care should be had to provide sufficient brake power. It was declared that there is less danger from the cars running loose than from cutting them off, both to men and to rolling stock. For the larger station yards inclined tracks are recommended, the best grade for which is one in a hundred, though one in eighty is permissible.

A plan and forms of tables for recording the statistics of the life of rails were adopted.

Finally, on motion of A. Woehler, a director of the Imperial Railroads of Alsace and Lorraine, a resolution was adopted declaring that a definite classification for iron and steel recognized by the government is in a high degree desirable; that to effect such a classification, official testing establishments must be established at suitable places which will make such tests for every one for a suitable compensation; that there should be connected with these testing establishments experiment stations at which, under proper direction, exhaustive experiments should be made to determine what requirements should be demanded for materials to answer special uses.

The Grain Movement for Fifteen Weeks.

The shipments of grain of all kinds from the eight principal Northwestern markets for each week since April 22 have been, in bushels, by lake and by rail:

Week ending	By lake.	By rail.	Total.	Per ct. by rail.
April 29	1,634,541	2,072,946	3,707,487	56
May 8	2,445,191	2,292,633	4,737,824	48½
" 13	1,538,526	2,302,940	3,841,466	60
" 20	1,602,170	2,016,304	3,618,474	55¾
" 27	1,747,408	1,820,456	3,567,814	51
June 3	2,412,162	1,797,922	4,210,084	42¾
" 10	2,804,915	2,147,670	5,042,585	42½
" 17	2,921,405	2,391,811	5,313,216	45
" 24	2,728,706	2,198,054	4,926,760	44½
July 1	1,821,155	1,784,548	3,605,703	49¾
" 8	1,765,010	1,205,184	2,970,194	40½
" 15	1,648,509	1,228,678	2,877,186	42⅝
" 22	2,269,336	1,032,825	2,302,161	31½
" 29	1,466,502	1,038,208	2,504,710	41½
Aug. 5	2,055,243	1,283,268	3,338,511	38½
Total for 15 weeks	30,950,778	26,613,447	57,564,225	46¼

The lakes thus continue to get much the largest part of the business—last week about five-eighths of the whole. That week there was a great increase in the shipments over those of the previous week, making the largest since June, but of the total increase of 834,000 bushels the railroads got but 145,000; a cent and three-quarters a bushel for wheat and a cent and a half for corn from Chicago to Buffalo are rates which the railroads do not seem inclined to meet. So long as they could get business from each other by underbidding, they seemed ready to do it; but there is, apparently, no such eagerness to get the traffic away from the lake vessels; and though there must be now many more unemployed cars than a month ago, the companies do not seem inclined to fill them at any price, as they were some weeks ago.

The receipts at Atlantic ports for the same fifteen weeks were:

	Corn.	Per cent of total.	All grains.	Per cent. of total.
New York	8,994,570	29.2	28,388,037	46.5
Boston	3,220,463	10.6	4,425,607	7.3
Portland	276,900	0.9	600,170	1.0
Montreal	1,361,370	4.4	5,979,012	9.8
Philadelphia	8,183,200	26.6	11,265,550	18.5
Baltimore	7,348,700	23.9	8,563,285	14.0
New Orleans	1,371,944	4.4	1,781,272	2.9
Total	30,761,147	100.0	60,972,933	100.0

The total receipts are very small (little more than one-half of the average), and those at New York are still smaller in proportion. It loses considerably in its comparative rank as a receiver both of corn and of grain generally, Philadelphia making the greatest gain. For the week, Philadelphia took 48¾ per cent. of the total corn receipts; Baltimore, 19 per cent.; New York, 13¼ per cent.; Boston, 9 per cent.; Montreal, 8 per cent. In grains of all kinds, also, Philadelphia leads, with 33 per cent., followed by New York, 26 per cent.; Montreal, 17½ per cent.; Baltimore, 15 per cent.; Boston, 6½ per cent.

These considerable changes from the course of previous weeks would be more significant were the receipts full. As they are exceptionally small, they can be looked on only as fluctuations which are instructive chiefly as they affect the result of the whole season's business.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Columbus & Toledo.—Track extended from Delaware, O., south 10 miles towards Columbus. The track from Carey is extended north by west 11 miles to Fostoria, and 4 miles south to Upper Sandusky, making 25 miles in all.

Worthington & Sioux Falls.—The first track is laid from Worthington, Minn., westward to Adrian, 19 miles.

Natchez, Jackson & Columbus.—Extended from Corrie Creek, Miss., east 10 miles. It is of 3½ ft. gauge.

Texas & Pacific.—On the *Transcontinental Division* track is extended from Texarkana westward 12 miles, and on the west end eastward to Clarksville, 16 miles.

Texas Western.—Extended 14 miles to Habermacher, Tex. It is of 3 ft. gauge.

This is a total of 96 miles of new railroad, making 1,142 miles completed in the United States in 1876, against 594 miles reported for the same period in 1875, 913 in 1874, 1,966 in 1873, and 3,372 in 1872.

British Railroad Iron has almost ceased to be imported into this country. In 1871 we took no less than 52¼ per cent. of the total British exports, those exports being the largest ever made; in 1875 but 1¼ per cent. of the much smaller British exports were to the United States. In 1871 we took 72 times as much British railroad iron as in 1875. What we took in 1871 would have laid 5,820 miles of track (with 56 lbs. rails); the imports of 1875 were only enough for 79 miles of track. For the five years beginning with 1871 the mileage of track which the imports would have provided for was 5,822, 5,310, 2,117, 128 and 79 miles respectively. The exports of Great Britain to the United States were nearly as great as (93⅔ per cent. of) its total exports to all countries in 1875.

Prices of Locomotives are given by the Chicago *Inter Ocean*, in answer to a correspondent who asks "the price of a standard-gauge locomotive," at "from $10,000 to $15,000, according to weight and finish." Locomotive builders would be very well pleased if these figures were correct, but the fact is, we believe, that if the *Inter-Ocean* correspondent is willing to pay from $8,000 to $8,500 for a first-class passenger or freight engine, with 16 by 24 in. cylinders—and more of that size are in use than of any other on Northern and Western roads—he can get all he wants at those figures. Smaller and lighter engines he can buy for proportionally smaller figures.

Essays Invited by the Institution of Civil Engineers.

The Council of the Institution of Civil Engineers (English) invite communications, of a complete and comprehensive character, on a variety of engineering subjects of which the following have either a direct or indirect reference to railroads and their traffic. For approved original communications the Council will be prepared to award premiums, arising out of special funds bequeathed for that purpose:

On the application of steam machinery for excavating, and the cost as compared with hand labor.

On the manufacture of cast and wrought iron and of steel of various qualities; on the effect of the admixture of foreign substances; and on the experimental tests by which the quality may be ascertained.

On the process of forging by steam hammers and other percussive machinery, and by the hydraulic press.

On the effects of pressure on cast steel in the mould.

On the results of experience in the recent extended use of steel in mechanism and works of construction.

On the alteration in the condition of metals caused by use or wear.

On the best mode of uniting steel and other metals employed in construction and in boiler work, and on the effect of the operations of punching, drilling and riveting on such metals.

On the construction of warehouses and other buildings for storing goods, with the special view of resisting fire, and on the relative merits of brickwork, iron and timber for that object.

On the construction of street tramways, the best means of adopting them for the conveyance of passengers and goods, and of preventing injury and inconvenience to other carriages traveling on the same road.

On modern methods of constructing the foundations of bridges.

On the design, generally, of iron bridges of very large span, for railway traffic.

On the comparative merits of European and American wrought-iron railway bridges.

On percussive and other rock drills.

On the appliances and methods used for tunnel-driving, rock-boring, and blasting, in this country and abroad, with details of the cost and of the results attained.

On railway rolling stock capacity in relation to the dead weight of the vehicles.

On the best mode of testing iron and steel rails for railways.

On improvements in the construction of furnaces and on combustion.

On the construction of steam boilers, adapted for very high pressures.

On the best practical use of steam in steam engines, and on the effects of the various modes of producing condensation.

On the results of experiments in steam jacketing.

On the relative cost of the conveyance of coal by rail and by steamer, and on the best mode of loading and unloading to diminish breakage.

On the ventilation and working of railway tunnels of great length.

On compressed air as a motive power, particularly as applied to machinery in mines and to locomotives in tunnels, with some account of its application on the Continent; and generally on the methods of transmitting force to distant points, including details of the existing systems of rope transmission.

On heavy and light wood-working machinery.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

St. Joseph & Pacific.—The bondholders who bought the Eastern Division of the St. Joseph & Denver City have organized a new company under this name and elected the following directors: Wm. Bond, John Baird, H. A. Johnson, Lawrence Wells, Louis Fitzgerald, Robert W. Donnell, H. H. Butterworth, Charles W. Hassler, F. W. Huidekoper, A. M. Saxton, E. A. Morrill, J. D. Brumbaugh, Edwin Knowles. The board elected Wm. Bond President; Thomas R. White, Jr., Secretary.

Kansas & Nebraska.—The bondholders who bought the Western Division of the St. Joseph & Denver City road have organized a new company under this name and elected the following directors: Wm. Bond, E. J. C. Atterbury, Peter A. H. Jackson, Augustus H. Miller, Charles W. Hassler, J. F. Navarro, H. H. Butterworth, Lawrence Wells, R. W. Donnell, E. W. Mealey, E. A. Morrill, J. D. Brumbaugh, Edwin Knowles. The board has elected Wm. Bond President; Thomas R. White, Jr., Secretary.

Portsmouth & Dover.—At the annual meeting in Portsmouth, N. H., Aug. 9, the following directors were chosen: Frank Jones, Daniel Marcy, John H. Broughton, Albert R. Hatch, Portsmouth, N. H.; Oliver Wyatt, Andrew H. Young, Charles H. Sawyer, Dover, N. H. The board re-elected Frank Jones President; George L. Treadwell, Vice-President; Wm. H. Y. Hackett, Clerk. The road is leased to the Eastern.

Portland & Ogdensburg, Vermont Division.—At the annual meeting in Hyde Park, Vt., Aug. 8, the following directors were chosen: Franklin Fairbanks, St. Johnsbury, Vt.; J. D. Bell, Walden, Vt.; J. H. George, Hardwick, Vt.; Oliff Abell, Walcott, Vt.; G. W. Hendee, Georgetown, Vt.; Waldo Brigham, Hyde Park, Vt.: Orange Buck, Johnson, Vt.; R. H. Reed, Fairfield, Vt.; D. D. Weed, Sheldon, Vt.; O. S. Rixford, Highgate, Vt.; A. B. Jewett, Swanton, Vt. The board elected Waldo Brigham President; John H. George, Secretary.

New York, Westchester & Putnam.—The stockholders have elected John W. Ellis and Philo C. Calhoun to fill vacancies in the board of directors.

Northern & Southern, of West Virginia.—At the annual meeting recently the following directors were chosen: John W. Strong, Wm. Montrose, Benj. W. Byrne, Gideon D. Camden, Albert S. Catlin, P. C. Van Schaick, Glenville Whittlesey, Oliver E. Wood, W. B. Hotchkin.

Santa Cruz.—At the annual meeting in Watsonville, Cal., July 25, the following directors were chosen: F. Hageman, Titus Hale, F. A. Hihn, R. C. Kirby, G. E. Logan, B. F. Porter, Amasa Pray. The board elected F. A. Hihn, President; G. E. Logan, Secretary; Titus Hale, Treasurer.

Clayton & Theresa.—At the annual meeting recently the following directors were chosen: A. F. Barker, John Johnson, Thos. Rees, S. D. Johnson, R. M. Esselstyn, James Johnson, Elijah McCarn, R. B. Biddlecome, R. T. Jerome, William Rogers, Nathan Holloway, John Dorr, John A. Snell. The road is leased to the Utica & Black River.

Pacific, of Missouri.—Mr. George Walsh, late Foreman of the Sedalia shops, has been appointed Master Mechanic there in place of G. B. Simonds, resigned.

Detroit, Eel River & Illinois.—Mr. Frank J. Hecker, late of the Ulster & Delaware and Rhinebeck & Connecticut roads, is appointed General Superintendent, with office in Logansport, Ind.

Rhinebeck & Connecticut.—Mr. J. H. Jones is appointed General Superintendent, in place of Mr. Frank J. Hecker, resigned.

Ulster & Delaware.—Mr. George Coykendall, General Freight and Ticket Agent, is appointed General Superintendent, in place of Frank J. Hecker, resigned. Mr. Wm. T. Dimmick is appointed Assistant Superintendent.

Hannibal & St. Joseph.—Mr. G. B. Simonds has been appointed Master Mechanic. He has been for some time in charge of the Missouri Pacific shops at Sedalia.

Indianapolis, Cincinnati & Lafayette.—The Receiver, Mr. M. E. Ingalls, has issued the following circular:

"The organization of the road under the Receiver will be as follows: Mr. George L. Barringer is appointed Assistant to the Receiver, with headquarters at Cincinnati. All requisitions must be sent to him; all purchases will be made through him; and all expense, bills, rolls, etc., will be approved by him, all passes signed by him. Mr. E. F. Osborn will act as Treasurer for the Receiver, and all checks will be signed by him. Mr. H. J. Page will have charge of all business pertaining to freight; Mr. John Egan, of all passenger and ticket business. Mr. J. S. Patterson will have charge of the machinery and car departments; Mr. J. C. McQuiston, of the road, bridges and stations. Mr. Joseph W. Sherwood is appointed Master of Transportation, with headquarters at Indianapolis, and will have charge of the movement of all trains and cars, all agents along the road, all yardmen, all trainmen, and all engineers and firemen when on the road. All heads of departments will report directly to me, and in case of my absence, such matters as need immediate attention will be attended to by Mr. Barringer. G. W. Bender, Superintendent Telegraph, will have his headquarters at Indianapolis."

Texas & Pacific.—At the annual meeting in Philadelphia, Aug. 8, the following directors were chosen: Thomas A. Scott, Frank S. Bond, John C. Brown, Matthew Baird, H. H. Houston, R. D. Barclay, Marshall O. Roberts, Henry G. Stebbins, Henry G. Marquand, W. T. Walters, Alfred Gaither, W. C. Hall, W. S. McManus, T. L. Nesmith, W. N. Harrison. The board elected officers as follows: President, Thomas A. Scott; Vice-Presidents, Frank S. Bond, John C. Brown; Treasurer, George D. Krumbhaar; Secretary, C. C. Satterlee.

Central, of Iowa.—At the annual meeting in Marshalltown, Ia., Aug. 7, the following directors were chosen: I. M. Cate, Horace Abbott, John S. Gilman, Thomas Kensett, H. C. Fahnestock, Isaac Hyde, Jr., F. W. H. Sheffield, G. E. Painter, John C. Crane, H. E. Boardman.

Buffalo, New York & Philadelphia.—Mr. Franklin S. Buell has been chosen Secretary and Treasurer in place of H. L. Lyman, resigned. Mr. Buell has been Assistant General Passenger Agent and Paymaster for some time.

Savannah & Memphis.—At the annual meeting in Opelika, Ala., Aug. 5, the stockholders elected P. P. Dickinson, of New York, President; W. L. Salisbury, T. E. Blanchard, Columbus, Ga.; John J. Smith, Allen D. Sturdevant, R. J. Thornton, R. M. Greene, W. B. Shapard, of Alabama, and H. J. Davison, of New York, directors; W. S. Greene, Secretary and Treasurer. The board met the same day and elected W. L. Salisbury Vice-President; W. S. Greene, Superintendent. The offices of Secretary and Treasurer and Superintendent were combined on the score of economy.

Worthington & Sioux Falls.—The officers of this company are: President, Horace Thompson: Vice-President, J. L. Merriam; Secretary, G. A. Hamilton; General Manager, J. W. Bishop; Chief Engineer, O. D. Brown. The general offices are at St. Paul, Minn. The company is controlled by the same parties who own the St. Paul & Sioux City.

Logansport, Crawfordsville & Southwestern.—Mr. J. P. Claybrook has been appointed Receiver, in place of S. D. Schuyler, resigned.

PERSONAL.

—Mr. H. L. Lyman, for six years past Secretary, Treasurer and General Passenger Agent of the Buffalo, New York & Philadelphia road, has resigned on account of failing health. Mr. Lyman has bought a large farm near Charlottesville, Va., where he will reside hereafter.

—Mr. Joseph Caverly, Master Bridge Builder of the Montclair & Greenwood Lake road, while superintending some repairs to a bridge over a street in Bloomfield, N. J., fell from the bridge to the street below and was instantly killed. The accident took place Aug. 9.

—Mr. W. L. Webber, Solicitor and Land Commissioner of the Flint & Pere Marquette Railroad Company, has been nominated for Governor by the Democrats of Michigan.

TRAFFIC AND EARNINGS.

Coal Movement.

Coal tonnages for the week ending Aug. 5 are reported as follows:

	1876.	1875.	Inc. or Dec.	P.c.
Anthracite	339,047	557,792	Dec. 218,745	39.2
Semi-bituminous, Broad Top	4,683	.....	.....	....
" Clearfield	21,063	16,999	Inc .. 4,064	23.9
" Cumberl'd	39,292	48,903	Dec.. 9,611	19.7
Bituminous, Barclay	5,671	7,190	Dec.. 1,519	21.1
" Allegheny Reg'n	3,767	18,280	Inc... 10,826	59.2
" Pittsburgh Reg'n	25,339			

The Lehigh Region and the Wyoming Region partly suspended production during the week.

During the seven months ending July 29, the Pittsburgh Division of the Baltimore & Ohio delivered to the Main Line at Cumberland 102,706 tons of coal, of which 62,938 tons were gas coal, 27,594 tons Keystone Company and 12,174 tons Elk Lick.

Ocean Freights.

There were unimportant fluctuations tending downwards during the week ending last Tuesday, when the following rates were made: New York to Liverpool, grain by steam 7¼d. to 7¾d.; cheese, 45s. to 50s. and bacon 35s. per ton; tobacco, 42s. 6d. per hogshead. New York to London, flour by rail, 2s. 6d. per barrel. A charter for grain to Cork for orders from Philadelphia was at 9d. per bushel; and for petroleum from New York at 5s. 6d. per barrel. Other petroleum charters were:

New York to Dublin, 5s.; to the Baltic, 6s. 3d.; to Genoa for orders, 5s. ½d.; Philadelphia to Antwerp, 4s. 10½d. and 5s.; to the Baltic, 6s.; Richmond to the Baltic, 6s.

The San Francisco *Bulletin* of Aug. 3 says: "There are 70,000 tons of tonnage in port, of which 40,000 tons are under engagement; and there are 30,000 tons overdue and about 270,000 tons more on the way or engaged to come. Most of the vessels now loading wheat, or to come on this month, were chartered some time ago at 60s. to 65s. There are no spot charters offering for wheat, and it is doubtful whether vessels can get over 50 to 55s.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending May 31:

	1875–'76.	1874–'75.	Inc. or Dec.	P. c.
Chicago & Northwest'n	$12,773,711	$12,707,727	Inc.. $65,984	0.5
Expenses and taxes..	7,408,858	7,984,695	Dec., 575,837	7.2
Net earnings..	$5,364,853	$4,723,032	Inc..$641,821	13.6
Earnings per mile...	8,516	8,472	Inc.. 44	0.5
Per cent. of expenses	58.00	62.83	Dec.. 4.83	7.7
Chicago & N. W., Proprietary Roads.....	1,240,021	1,078,577	Inc.. 161,444	15.0
Expenses.....	865,432	796,573	Inc.. 68,859	8.6
Net earnings.....	$374 589	$282,004	Inc.. $92,585	32.9
Earnings per mile...	2,525	2,197	Inc.. 328	15.0
Per cent. of expenses	69.79	73.85	Dec.. 4.06	5.5
Texas & Pacific.....	1,564,625	1,183,313	Inc.. 381,312	32.2
Working expenses...	891,882	789,804	Inc.. 102,078	12.9
Net earnings.....	$672,743	$393,509	Inc..$279,234	71.0
Earnings per mile...	4,814	3,698	Inc.. 1,116	30.2
Per cent. of expenses	57.00	66.74	Dec.. 9.74	14.6
Indianapolis, Cin. & Lafayette.....	$1,637,061	$1,767,231	Dec..$130,170	7.4
Working expenses...	919,364	1,056,312	Dec.. 136,948	13.0
Net earnings.....	$717,697	$710,919	Inc.. $6,778	1.0
Earnings per mile...	9,146	9,873	Dec.. 727	7.4
Per cent. of expenses	56.16	59.77	Dec.. 3.61	6.0

Seven months ending July 31:

	1876.	1875.		
Atchison, Topeka & Santa Fe.....	$1,240,686	$687,830	Inc..$552,856	80 4
Atlantic & Pacific.....	699,898	647,151	Inc.. 52,747	8.2
Cairo & St. Louis.....	145,757	142,929	Inc.. 2,828	2.0
Canada Southern.....	935,794	622,846	Inc.. 312,948	50.2
Central Pacific.....	9,408,000	9,446,408	Dec.. 38,408	0.4
Chicago & Alton.....	2,643,970	2,500,411	Inc.. 143,559	5.7
Chicago, Milwaukee & St. Paul.....	4,645,938	4,234,836	Inc.. 411,102	9.7
Denver & Rio Grande..	228,020	202,652	Inc.. 25,368	12.5
Illinois Central.....	4,030,604	4,201,975	Dec.. 171,371	4.1
Indianapolis, Bloom. & Western.....	858,038	684,932	Inc.. 173,106	25.3
International & Great Northern.....	640,817	661,752	Dec.. 20,935	3.2
Michigan Central	3,896,111	3,662,197	Inc.. 233,914	6.4
Midland, of Canada...	146 348	157,745	Dec.. 11,397	7.2
Missouri, Kan. & Texas	1,642,146	1,440,750	Inc.. 201,396	14.0
Ohio & Mississippi....	2,095,415	1,828,220	Inc.. 267,195	14.6
St. Louis, Alt. & T. H., Belleville Line.....	263,610	313,839	Dec.. 50,229	16.0
St. Louis, Iron Mountain & Southern	1,972,886	1,869,190	Inc.. 103,696	5.5
St. Louis, Kansas City & Northern....	1,717,202	1,388,839	Inc.. 328,863	23.7
Toledo, Peoria & Warsaw.....	786,031	518,732	Inc.. 267,299	51.5
Six months ending June 30:				
Hannibal & St. Joseph.	$904,702	$745,381	Inc..$159,321	21.4
Month of June:				
Hannibal & St. Joseph.	$141,426	$122,455	Inc.. $18,971	15.5
Month of July:				
Atchison, Topeka & Santa Fe.....	$194,194	$112,705	Inc.. $81,489	72.3
Atlantic & Pacific.....	88,600	84,400	Inc.. 4,200	5.0
Cairo & St. Louis	21,689	19,410	Inc.. 2,279	11.8
Canada Southern.....	108,787	104,897	Inc.. 3,890	3.7
Central Pacific..... ..:	1,507,000	1,536,225	Dec.. 29,225	1.9
Chicago & Alton.	397,260	387,445	Inc.. 9,824	2.5
Chicago, Milwaukee & St. Paul.....	685,753	842,395	Dec.. 156,642	18.6
Denver & Rio Grande, Main Line	30,887	29,663	Inc.. 1,224	4.1
Denver & Rio Grande, Trinidad Extension..	8,233	.....	.....	....
Illinois Central.....	482,003	715,899	Dec.. 233,856	32.5
Indianapolis, Bloom. & Western.....	88,507	87,445	Inc.. 1,062	1.2
International & Great Northern.....	72,870	70,986	Inc.. 1,884	2.7
Louisville & Nashville.	357,539	303,455	Inc.. 54,084	17.8
Michigan Central.....	430,627	467,159	Dec.. 36,532	7.8
Missouri, Kan. & Texas	224,308	211,735	Inc.. 12,573	6.5
Ohio & Mississippi	247,646	239,156	Inc.. 8,490	3.6
St. Louis, Alton & Terre Haute, Belleville Line	29,538	35,753	Dec.. 6,215	17.3
St. Louis, Iron Mt. & Southern.....	253,500	226,241	Inc.. 27,259	12.1
St. Louis, Kansas City & Northern.....	216,917	153,497	Inc.. 63,42'	41.3
Toledo, Peoria & Warsaw.....	92,606	89,317	Inc.. 3,349	3.8
First week in August:				
Chicago & Alton.....	104,129	84,811	Inc.. 19,318	22.8
Chi., Milwaukee & St. Paul.....	142,000	162,406	Dec.. 20,406	12.6
Ohio & Mississippi	74,600	61,151	Inc.. 13,449	22.0
St. Louis, Iron Mt. & Southern.....	70,600	55,771	Inc.. 14,829	26.6
Week ending July 28:				
Great Western, of Canada.....	£12,822	£14,011	Dec.. £1,189	8.4
Week ending July 29:				
Grand Trunk	£33,500	£36,5 0	Dec.. £3,000	8.2

Grain Movement.

Receipts and shipments of grain of all kinds for the week ending Aug. 5, in bushels, are reported as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts....	2,854,4.2	2,587,841	Inc.. 266,621	10.3
Lake ports' shipments.	3,338,511	2,471,616	Inc.. 866,895	35.1
Atlantic ports' receipts.	2,217,474	3,895,879	Dec..1,678,405	43.0

Of the lake ports' shipments 38⅛ per cent. went by rail this year, against 15¾ per cent. last year and 23⅛ in 1874. Compared with the previous week of this year, there was a slight decrease in lake ports' receipts, a very large increase in their shipments, and a considerable decrease in receipts at Atlantic ports.

Chicago receipts and shipments for the week ending Aug. 12 were:

	1876.	1875.	Inc. or Dec.	P. c.
Receipts.....	1,842,528	1,065,271	Inc.. 777,257	73.0
Shipments.....	1,431,649	1,599,602	Dec.. 167,953	10.5

San Francisco shipments for July, the first month of the California crop year, were as follows:

	1876.	1875.	Increase.	P. c.
Flour, barrels.....	33,600	33,100	500	1.5
Wheat bushels.....	1,076,333	468,500	607,833	129.7
Total bushels.....1,244,333		634,000	610,333	96.3

The wheat all went to England except 6,667 bushels to Australia. Of the flour 17,200 barrels went to England, 10,000 to China and Japan, the rest to Central America, the Pacific islands and Australia. The movement was greater than for the corresponding month in any previous year.

Southern Freight Rates.

A new tariff of rates from New York to Southern points has been established. The new rates per 100 lbs. are as follows:

New York to—	1st class.	2d class.	3d class.	4th class.	5th class.	6th class.
Charlotte and Salisbury, N. C.....	$1 15	$1 00	$0 85	$0 70	$0 60	$0 45
Greenville and Spartanburg, S. C.....	1 15	1 00	0 85	0 75	0 60	0 45
Chattanooga, Tenn., Atlanta and Dalton, Ga.....	1 45	1 25	1 00	0 80	0 60	0 50
Rome, Ga.....	1 50	1 30	1 05	0 85	0 65	0 55
Selma and Montgomery, Ala.....	1 50	1 30	1 05	0 85	0 70	0 60

Rates to local points in proportion. The rates are from 10 to 15 per cent. above those lately in force.

Delaware Peach Traffic.

During the week ending Aug. 12, there passed through Wilmington, Del., on the Delaware Railroad, 556 car-loads of peaches. The greatest number was on Friday, when 113 car-loads were shipped. The total shipments up to and including Aug. 12 were 703 car-loads.

Iron Movement.

The shipments of iron ore from the Lake Superior R gion from the opening of navigation up to Aug. 2 were as foll ws:

	1876.	1875.	Inc. or Dec.	P. c.
Marquette.....	226,379	243,4:2	Dec..17,033	7.0
Escanaba.....	176,411	119,904	Inc...56,507	47.1
L'Anse.....	37,945	32,746	Inc... 5,199	15.9
Total.....	440,735	396,062	Inc...44,672	11 3

Shipments of pig iron this year have been from Marquette, 5,159 tons; Grand Island, 6,374 tons; total, 11,533 tons.

THE SCRAP HEAP.

Railroad Manufactures.

The Danforth Locomotive Works, at Paterson, N. J., have discharged a number of men. Most of the work of changing engines from 6 ft. to the standard gauge for the Delaware, Lackawanna & Western road has been completed, and the work remaining on hand is not pressing.

The new Raven Cliff Furnace, near Wytheville, Va., is completed, and has gone into blast.

The Lawrence Rolling Mill, at Ironton, O., has been at work on some small orders for light rails for coal mines.

The Marquette (Mich.) *Mining Journal* says: "No. 1 stack of the Pioneer Furnace produced 10,530 tons in a run of 14 months, and the hearth is still good for several months' longer run."

A new company has been organized to carry on the Ohio Falls Car Works at Jeffersonville, Ind. The name is the Ohio Falls Car Company, the capital stock $150,000, and the corporators and directors are James H. McCampbell, Samuel A. Hartwell, Samuel Goldback, J. L. Smyser and Joseph W. Sprague.

The sheet mill of the Sligo Iron Works, near Pittsburgh, resumed work Aug. 7, employing about 60 men. The entire works will start up soon.

The Pittsburgh Tube Works of Rhodes & Potter are to be fitted with new machinery, and will, it is expected, be ready to start about Oct. 1.

The National Iron Company's furnace No. 1, at Depere, Wis., made in the week ending July 29, 274 long tons of Bessemer pig, using 506 tons ore, 14 tons limestone and 26,768 bushels charcoal. The furnace is 45 ft. high, 9½ ft. bosh, hot b ast.

The Philadelphia & Reading Railroad Company's rail mill at Reading, Pa., is filling an order for 62-pound rails for the Delaware & Hudson Canal Company.

The Portland (Me.) Rolling Mill is to make 3,500 tons of iron rails for the Vermont Division, Portland & Ogdensburg Railroad.

In addition to 40 narrow-gauge cars for the Burlington & Northwestern road, lately noted, the Missouri Car & Foundry Company, at East St. Louis, are building 10 more cars for the same road; 100 box and coal cars for the Atchison, Topeka & Santa Fe; 100 box cars for the Kansas City, St. Joseph & Council Bluffs, and 30 wooden-ware box cars for Samuel Cupples & Co., of St. Louis, for the California trade.

Quick Work in a Car Shop.

The Scranton (Pa.) *Republican* of July 26, speaking of the change of gauge on the Delaware, Lackawanna & Western, says: "The work of narrowing the coal cars to suit the altered gauge of the road, still progresses briskly at the shops in this city. The number that have undergone the necessary change since the middle of last March amounts to 5,472 cars. The cars are turned out at the rapid rate of from 50 to 55 per day. The men are aided by the most perfect machinery. During the busiest period intervening since March, the most remarkable day's work—accomplished in 24 hours—was to remove and replace 164 pairs of wheels, cut the axles, and have them in complete order within the short space of a day and a night. About 900 men have been steadily employed since March."

Forging Requests for Passes.

The Chicago *Inter-Ocean* of Aug. 10 says: "Yesterday a renewed and wholesale attempt was made in this city to secure railroad passes by forging the name of a prominent official. The method pursued was exactly that followed by the two young experts, Rogers and Costello, whose plots for swindling the profession, successful in their case, were published exclusively in this paper some two months ago. Those fellows, it will be remembered, were let off scot-free by a judicial decision, and to this is attributed the bold development of yesterday. At the same time there is little doubt that the increased caution which has been exercised by the general passenger agents ever since the announcing of that decision was the direct cause of failure of this latest attempt to beat the railroads.

"A well dressed young man, a little before noon, entered the Superintendent's office at the Chicago & Alton headquarters, No. 2 West Van Buren, and handed the clerk a conventionally-worded request for a pass to St. Louis and return. The letter bore what purported to be the signature of the General Passenger Agent of the St. Louis, Iron Mountain & Southern road. Not suspecting anything irregular the clerk at once filled out the necessary blank, since these interchanges of passes between the different roads, although in reality courtesies, have come to be looked on as purely business arrangements, and are never refused when properly requested. Just as the passes, however, were being handed to the visitor his strange conduct, and especially the unusual warmth of gratitude manifested, caused the clerk to retain them, saying that the pass needed a counter-signature, and that if he would drop in again late in the afternoon it would be ready for him. The young man bowed himself out, when the clerk stepped over to the operator's desk in the corner of the office, and in a few minutes received a return telegram from the head-quarters of the St. Louis road declaring the letter a forgery. It was too late then to secure the rogue, but proper arrangements were made for his reception when he should return. Five o'clock came, however, and, an hour later, office-closing, but with them no rogue—and if he is wise he will not attempt to keep a postponed engagement. Several visits were also made, at an earlier hour of the day, to the headquarters of the Chicago, Rock Island & Pacific, and the Chicago, Burlington & Quincy roads, at both of which requests for passes were presented, signed with the same name as in the Alton case. It so happened that the proper authorities at both offices were out, and the letters were held over for their inspection, with the understanding that the man should return before night. But he failed to come to time in these cases, al o being undoubtedly alarmed in the meantime by the somewhat suspicious treatment he met with at the Alton."

The Bible on the Free Pass Question.

The Detroit *Free Press* publishes the following correspondence between the superintendent of an asylum for the feeble-minded in Illinois and a well-known railroad superintendent:

DEAR SIR—You sent me a few days since a *half-fare permit* which please *fully permit* me to thank you for.

Half-fare permits are usually sent to preachers, and perhaps you have mistaken my calling. At all events as you have classified me with the preachers (though I am not one) I will take the liberty of quoting Scripture to you, and of drawing such conclusions from said Scriptures as seem applicable to our relation to each other.

If my authorities are inapplicable and my conclusion unsound, please remember that the principal of an asylum for feeble-minded children is *trying to preach*, because an individual labeled Strong very early in life by his paternal or maternal ancestor, has insinuated that he is a preacher.

I respectfully call your attention to the following passages of Scripture:

Exodus 6, 10—"With a *strong* hand shall let them go."
Judges 14, 4—"Out of the *strong* came forth sweetness."
Two Chron., 16, 9—"Strong in b*ehalf* of them."
(Half in this case means not the half I now have, but the other half of a permit so that I shall have a full free pass for the year.)
Psalms 31, 21—"He hath showed me his kindness in a *strong*."
1 Kings 3, 2—"Be *strong* and show thyself a man."
1 Sam. 4, 9—(Wm.) "B(e) Strong and quit yourself like a man."
1 Cor. 4, 10—"We are weak but ye are *strong*."
Jeremiah 15, 14—"I will make thee to *pass*.
Ezekiel 20, 37—"I will cause thee to pass."
Ezekiel 37, 2—"And caused me to pass."
Joshua 22, 19—"Then pass over."
Special comment is unnecessary.

If the above passages do not find or reach some responsive chord in your bosom, other language will, of course, utterly fail to impress you.

A few practical applications and I am done.

Firstly. What I want and I think you might send me, is an annual pass over the Michigan Central Railroad and Great Western (if in your power), because Samuel, Jeremiah, Ezekiel, Joshua and Judges plainly instruct you to do so (as I construe them).

Secondly. The aforesaid roads will not lose anything by it, but probably gain, for if I have this pass it is more than likely that I shall go East once or twice this year and take parties with me who will otherwise go by the Toledo, Wabash & Western and the Lake Shore, if they are deviated from that course to accompany me.

Thirdly and lastly (in order that I may, as Mr. Moody recommended to the preachers of Philadelphia, not to exceed thirty minutes in my discourse and lose something of its power by excessive length), I would suggest that I desire to operate upon Michigan to see if I cannot stimulate them to build an asylum for idiots. I have succeeded in getting the Legislature of Illinois to give $185,000 for a new building for its asylum; and as this is in process of construction, I would like to visit the charitable institutions in Michigan, Canada and the East to see what should be done to make ours what it ought to be. I cannot go unless I get passes.

You probably can, if you will, get me the aforesaid, but if you do not, in the hereafter when you are seeking a free pass to the better world, look out that somebody don't send you a *half-way* permit, and land you considerably short of your desire. (Pardon me.)

THE REPLY.

DEAR SIR—My absence from the city last week prevented a prompt answer to yours of the 4th inst. It is an old experience that the Scripture can be made to sustain any doctrine or dogma if it be ingeniously applied, but I confess that I was astonished at such an array of texts upon which to base a claim for travel over our road, and the more so, because, in sending you the half-fare permit I thought I was complying strictly with the most liberal offers of transportation to be found in the Bible.

Early in the history of the Jews we find the account of their emigration from Egypt, and certainly going in such numbers they would be entitled to as low a rate of fare as could be consistently asked by or granted to any one; yet in the 13th verse of the 30th chapter of Exodus I find the following: "This they shall give—every one that *passeth*—a *half*." If this does not cover the case I know not where to look for authorities.

In one of your citations you refer to what you are pleased to call the "other half" of the permit which I sent you. I fear that it would be of little service, since our conductors, being better versed in mathematics than theology, would be sure to collect full fare from anyone traveling on two half-fare permits.

But to convince you that I look to Holy Writ as an authority for declining free passes, permit me to quote a few precepts on the subject of passenger transportation which I find in its pages, beginning with such as seem especially addressed to the passenger:

1 Kings, 20, 39—"Thou shalt pay."
2 Kings, 4, 7, 8; 2 Samuel, 1, 5, 6—"*Go* and *pay*."
Ecclesiastes, 5, 4—"Defer not to pay."
Exodus, 21, 18—"He shall pay."
Exodus, 21, 36—"He shall *surely* pay."
Numbers, 20, 18—"Thou shalt not pass."

With the following from third verse of the first chapter of Jonah, showing that passes were no easier to procure then than now: "So he paid the fare, and went," setting an example still worthy of imitation.

In addition to these precepts to the passenger, I find the following injunctions to the railroad manager:

Judges, 3, 28—"Suffer no man to pass."
Nahum, 1, 15—"The wicked shall no more pass."
Isaiah, 34, 10—"None shall ever pass."
Matt., 24, 34, 8; Mark, 13, 20—"This generation shall not pass," and the following from the prophet Jeremiah, 51, 42—"Though they roar, yet shall they not pass."

Perhaps after this array of Scripture authority, I shall not be justified in sending you the annual desired, yet I find my sympathies stronger than my theology, and so, having overwhelmed you with my citations, and convinced you that a concordance is an article as well known in Chicago as in Jacksonville, I take pleasure in sending you the pass requested.

An Old Engineer.

Mr. Daniel Hull, who claims to be the oldest locomotive engineer in Pennsylvania, is now living in Chambersburg, Pa., in the 77th year of his age. Originally a carpenter by trade, he went upon the old road from Philadelphia to Lancaster in the fall of 1834, and in the following spring was promoted to an engine. In 1838 he went upon the Cumberland Valley road, re-

maining there five years on an engine and seven in charge of the Chambersburg shops. He then passed several years on the New York & Erie, the Pennsylvania and the Schuylkill & Susquehanna roads, besides being employed first by Norris and then by the Lancaster Locomotive Works to take out new engines. He finally returned to the Cumberland Valley in 1864 and has since remained there, having been for three years past, on account of his age, relieved from his engine and employed as flagman at a street crossing in Chambersburg. Mr. Hull met with no accident until Jan. 28, 1867, when his engine was thrown from the track in a snow-drift and he had a wrist dislocated. He is father of Mr. A. S. Hull, now Master Mechanic of the Cumberland Valley road.

An Unlucky Baggageman.

The Albany (N. Y.) *Express* says: "An unknown genius entrusted a trunk, with a hive of bees in it, to the tender mercies of a Syracuse baggage-smasher the other day. The company will pay for the bees, and the doctor thinks his patient will be around again in a fortnight or so."

An Insinuation.

"Madame," said a conductor, a day or two since, "your boy can't pass for half fare; he's too large."

"He may be too large *now*," replied the woman, who had paid for a half ticket, "*but he was small enough when he started!*"

The train had been delayed all night at a way station.

RAILROAD LAW.

Rights of Passengers.

The St. Louis *Central Law Journal* says: "The question as to what rights a passenger on a railway train is presumed to have, and how far he will be justified in maintaining them, seems to be in rather an unsettled condition. Some courts hold practically that he has no rights at all, but that from the time he enters the train he is entirely at the mercy of the servants of the corporation. That it should become a settled rule of law that a passenger on a train must submit to all the rules of a company and the commands of its subordinates, whether reasonable or unreasonable, without resistance or indemnification, would be a grievance indeed to a very large class of citizens who require to make frequent use of this kind of conveyance. In one of the courts of Ohio the other day, in the case of Shelton vs. L. S. & M. S. R. R., 1 Cinn. *Law Bulletin*, 190, the conductor of a train having wrongfully taken up a commutation ticket belonging to the plaintiff, before the number of rides evidenced by it had been obtained, the plaintiff refused to pay his fare twice, and the conductor having ejected him from the car, he brought suit against the company. The Court instructed the jury, that the wrongful act of the company by its agent, in taking up plaintiff's ticket, did not entitle him to refuse to pay his fare or produce his ticket on the same day when called on for it, and if he did so, the defendant had the right to cause him to be removed from the train. The Court founded its extraordinary charge on the case of Townsend *v.* The N. Y. C. & H. R. R. R., 56 N. Y., 295, where it was held that no one has a right to resort to force to compel the performance of a contract made with him by another. It is satisfactory to find that the rule in this case has lately been very much modified in English *v.* Delaware & Hudson Canal Company, 4 Hun., 683. Here the plaintiff had once paid his fare, and when it was again demanded, refused to pay, and resisted an attempt to eject him from the cars, and for the damage done brought action against the company. The Court held that when a conductor of a railway train wrongfully attempts to remove a passenger from a train, such passenger has a right to protect himself against the attempt, and resistance can lawfully be made to such an extent as may be essential to maintaining such a right, and resisting the wrongful expulsion. The Court also held that the doctrine in Townsend *v.* N. Y. C. & H. R. R. R. is not applicable to a case where the conductor is in the wrong in his action. The Ohio case was in every respect similar to this, the passenger refusing to pay his fare twice. We regret that the Court in instructing the jury, instead of only recollecting the old New York case, which could be made to shield the company, had not considered the late case in that State which we have alluded to, which would, if followed, have protected the passenger."

Connecticut Constitutional Amendments.

Of several amendments to the State Constitution now pending in Connecticut two refer to railroads, and are as follows:

The General Assembly shall pass no special, local or private acts in any of the following cases, viz.:

Conferring special privileges, corporate powers, or exclusive privileges or franchises to any private corporation, association or individual. * *

Granting to any corporation, association or individual the right to lay down railroad tracks. * *

The General Assembly shall pass general laws providing for the cases above enumerated.

No county, city, town, or other municipality, shall ever subscribe to the capital stock of any railroad corporation, or become a purchaser of the bonds, or make donation to, or loan its credit, directly or indirectly, in aid of any such corporation; but nothing herein contained shall affect the validity of any bonds or debts incurred under existing laws, nor be construed to prohibit the general assembly from authorizing any town or city to protect by additional appropriations of money or credit any railroad debt contracted prior to the adoption of this amendment.

Contractors' Rights to Materials on Hand.

In Chandler against De Graff and others, on appeal, the Minnesota Supreme Court holds as follows:

A contract to furnish ties and other material, and to construct and complete a definite line of single-track railroad for a given compensation payable in installments as the work progresses, upon monthly estimates of the amount of work done and materials furnished, is a contract for work and material and not of sale; until placed in the track the property in ties furnished under such a contract remains in the contractor, even though prior thereto they may have been inspected by the railroad company and included in the monthly estimates.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.

The following is the text of the circular issued by the company June 26, to which reference has been made heretofore, but the authenticity of which has been questioned by some Amsterdam readers:

"The board of directors of this company, after careful consideration, have determined upon the following policy, viz.:

To use the earnings of the road—

1st. To keep the road in good condition and repair.

2d. To pay the coupons upon the first mortgage, land and income land bonds.

3d. To pay all other obligations of the company as far as they can do so and avoid creating a floating debt.

The directors believe that this policy will be approved by a large majority of those who are interested in the securities.

The company have not the full means, at this time, to meet the coupons on the note, due July 1, 1882, and propose to pay one-half of said coupons in cash and the balance in scrip, payable July 1, 1882, with interest on the same at 7 per cent. annually, giving the holders of said notes the option of exchanging them for the consolidated bonds at the face value, adjusting the difference of interest."

More than half of the 430,000 notes due 1882 have been already funded in consolidated bonds.

Ashuelot.

In the long pending suit of the Ashuelot Railroad Company against J. H. Eliot, Trustee, and others, the New Hampshire Superior Court has given a decision substantially confirming the report of the Master in Chancery. The Trustee is also held to be responsible for profits on sale of bonds and interest on the same, amounting in all to about $21,000. In thus deciding, the court expressly stated that nothing in the case was held to reflect upon the integrity or judgment of the Trustee. As to the claim of the Cheshire Railroad Company for compound interest upon the bonds held by it, the court decided that simple interest only should be allowed. This makes a difference of nearly $54,000 in the amount due.

The suit is brought by the stockholders to recover possession of the road, which has been for a number of years in the hands of the trustee under the first mortgage, who leases it to the Cheshire Railroad Company.

New Haven & Northampton.

The managers of this road still refuse to comply with the writ of *mandamus* of the Superior Court of Connecticut, and to stop their trains at Plantsville. An application was to be made this week to the Supreme Court for an injunction to restrain the State authorities from carrying out the orders of the Superior Court and compelling compliance with the writ.

Pittsburgh, Titusville & Buffalo.

The Pennsylvania Transportation Company, which recently obtained a heavy judgment against the old Oil Creek & Allegheny River Company for breach of contract, has applied for an attachment upon the money received for that road at the foreclosure sale, which is now in the custody of the United States Circuit Court awaiting distribution. The Court granted a rule to show cause why the attachment should not be issued.

Dividends.

Dividends have been declared by the following companies:

Chicago & Alton, 4 per cent., semi annual, payable Sept. 12. Transfer books will be closed from Aug. 19 to Sept. 12.

Pennsylvania, 2 per cent., quarterly, payable Aug. 30.

Pittsburgh, Cincinnati & St. Louis.

A special meeting of the stockholders will be held at the office in Columbus, O., Sept. 15, at 10 a. m., "for the purpose of submitting to them for their assent and approval, under the terms of the law in such case made and provided, a contract between the Pittsburgh, Cincinnati & St. Louis Railway Company, as lessee of the Cincinnati & Muskingum Valley Railway, the Ohio Central Railway Company, the Cincinnati & Muskingum Valley Railway Company, and Messrs. Vibbard, Ball & Co., which contract provides, among other things, for extending a certain degree of aid to the Ohio Central Railway Company, and for the use of portions of the railways mentioned in said contract."

The Ohio Central is the road formerly known as the Atlantic & Lake Erie, and Vibbard, Ball & Co. are the contractors for its construction.

New York & Long Island Bridge.

The time for receiving plans for this bridge has been extended by the board of directors to Dec. 1, 1876. The bridge company will pay for the plan adopted $1,000; for the second best, $500, for the third $250, the plans which are paid for to be the property of the company. The award is to be made by the board of directors under advisement of the board of consulting engineers.

Cairo & St. Louis.

The operations for June are reported as follows:

Gross earnings, $172 per mile)	$25,222 19
Working expenses (72.53 per cent.)	18,279 53
Extraordinary expenses (11.86 per cent.)	3,061 93
Total expenses (84.41 per cent.)	$21,341 46
Net earnings	$3,880 73

Passenger trains ran 10,786 miles; freight trains, 8,662 miles; coal trains, 7,320 miles, making a total of 28,268 miles. The average earnings per train were $0.76 for passenger, $1.02 for freight, and $0.96 for coal trains.

Ohio & Mississippi.

On the night of the 9th a strike among the freight brakemen of this road broke out at Seymour, Ind., in consequence of a reduction in pay ordered by the company. The strikers stopped all freight trains, uncoupled the engines and compelled the enginemen to leave their trains upon the sidings. The next day the strike extended to Vincennes, North Mitchell and Vernon, the principal yards on the line, and matters became further complicated by a demand of the men for two months' back pay due them. Freight traffic was completely stopped, though the passenger trains were allowed to pass. Application was made to the Governor of Indiana for assistance, without success, and a force sent from Cincinnati to clear the road was overawed by the strikers and refused to act. General Superintendent Waldron, who went to Seymour in a special train, had his car run on a siding by the strikers, the engine detached and the switches spiked fast, making him virtually a prisoner.

Aug. 12 a meeting was held at Seymour, the company offering to pay off at once for June, to pay for July in checks dated early in September, and to pay off and discharge those who wished to leave the road. Many of the men accepted these terms, and for a time it was thought that the trouble was at an end, and preparations were made to resume the movement of trains. The men at North Vernon and Vincennes, however, refused to accept the action of those at Seymour, and the strike continued. Mr. Waldron and Division Superintendent Gimperling, who had gone to Vincennes, were threatened with personal violence, though none was actually offered to them. The Governor of Illinois promptly furnished local authorities with assistance to put down all riotous demonstrations, but in Indiana the strikers appear to have had full sway for a time. It is fair to state, however, that a number of the men emphatically deny that any violence was offered to the officers of the road, or that anything was done further than to uncouple the cars and prevent trains from moving.

As the strike continued, however, many of the men became discouraged and were willing to accept the company's terms, and in this way the trouble appears to have approached its end, by a gradual weakening and disintegration. The latest dispatches up to noon of Aug. 16 say that the strike was then practically at an end and preparations were being made to resume the movement of trains.

The new scale of wages adopted, which was the first occasion of the trouble, was as follows: Passenger conductors, $95 per month; baggagemen, $48.50 per month; passenger brakemen, $42.50 per month; freight brakemen, on local freight, $1.60 per day; on through freight, $1.50 per day. The price previously paid the freight brakemen was $1.75 per day.

Galveston, Houston & Henderson.

In addition to the change of gauge, the new management of this company is actively engaged in improving the condition of the road. The road-bed is being ditched thoroughly on both sides, 8,000 new ties have already been laid, and 8,000 more are to be put down; 1,000 tons of new fish-bar iron have also been laid and more has been ordered. The road is also being baldasted with shell from Galveston. The company has ordered three new freight engines and one switching engine, and is preparing to furnish all the passenger equipment with the Miller platform and the Westinghouse air brake.

The recent change of gauge was made very successfully, though some delay was caused by the bad condition of parts of the old track. The new iron mentioned above had, however, been previously laid as a third rail on the worst section, which helped matters very much.

New Jersey West Line.

An engineer employed by the bondholders recently made an examination of the line from Summit, N. J., to Newark. Nearly all of this portion of the line was graded and the bridges and trestles built some four years ago. His report is that to put the line in good order, complete it and lay the track will require about $300,000. The distance is about 12 miles.

It is also reported that the Delaware, Lackawana & Western Company desires to secure possession of the road, chiefly in order to use a part of the graded line east of Summit to straighten and improve its own line.

Texas & Pacific.

On the Transcontinental Division the track, on the western end, is laid to Clarksville, 33 miles east of Paris and 16 miles beyond the last point noted. On the eastern end track is down to a point 30 miles west of Texarkana, leaving a gap of 25 miles. Work is progressing very actively, and it was expected that the last rail would be laid this week, completing the line of 152 miles from Sherman to Texarkana.

The question of the extension of time on the State land grant, which is pending before the Texas Legislature, is now in a somewhat involved condition. The extension passed the Senate and was pending before the House when the time for the final adjournment, fixed previously by joint resolution for July 31, arrived. The Legislature, however, continued to sit, but the minority opposed to the extension left the House, contending that it was not legally in session. This left the House without a quorum and nothing could be done. Efforts have been made for a compromise, but without success at latest accounts. Even if the extension bill is passed, it is said that the question of the legality of the continued session will have to be settled by the courts. The division in the Legislature is chiefly local, the members from Northern Texas favoring the extension while those from the southern and western sections of the State oppose it.

Worthington & Sioux Falls.

This company was organized in March last by gentlemen prominently connected with the St. Paul & Sioux City and the Sioux City & St. Paul companies. It was originally called the St. Paul & Dakota, but the name was subsequently changed to the present one. The object of the company is to build a railroad from the Sioux City & St. Paul, at Worthington, Minn., by way of Luverne, the county seat of Rock County, to Sioux Falls, Dakota, and eventually to extend the line westward or southwestward across Dakota to the Missouri River. A correspondent interested in the line writes us:

"The road was located definitely from Worthington to Luverne (34 miles), and a preliminary survey made from Luverne to Sioux Falls, in April and May.

"The contracts for the grading were let about May 20, and the grading was completed to Luverne, Aug. 1.

"The tracklaying commenced about July 1, and will be completed to Luverne about Sept. 1.

"The gauge is 4 ft. 8½ in.; the rails used are Milwaukee Iron Co.'s reheated iron rails, 45 lbs. per yard, and the road is being well and substantially built in all respects. There will be four stations established on it this summer: Miller, 12 miles; Adrian, 19 miles; Drake, 26 miles, and Luverne, 34 miles from Worthington.

"At Adrian a town has been laid out, and a depot building, grain houses, hotel, stores, etc., are in progress of construction, the track having been already completed to that place.

"At Luverne a depot building, wheat elevator, grain and coal houses, engine-house, turn-table and water supply are to be erected on the railroad grounds as soon as the track reaches that place.

"The country is well settled and improved all the way from Worthington to Sioux Falls and for 30 miles north, west, and south of the latter place.

"The first 40 miles of the road lies within the land grant of the St. Paul & Sioux City and Sioux City & St. Paul companies, which lands are made more accessible and valuable by the building of the new line.

"When completed the new road is to be operated by and in the interest of the two older companies named, both of which are and have always been under one management, though separate in organization.

"The new line will be fully completed to Luverne and equipped for business about Oct. 1, though car load freights will be taken as soon as the track is laid through, or about Sept. 1.

"This road is one of the first substantial fruits of the repeal (a year ago last winter) by the Minnesota Legislature of all the so-called Granger legislation. The Sheldon & Beloit line, similarly situated as to location and other inducements for building it, but in Iowa some 30 miles south of the one now in progress, was organized under similar auspices, and up to the failure of the Iowa Legislature last winter to repeal the tariff laws yet in force in that State, was likely to be constructed simultaneously with it. Nothing has been or can be done on it, however, under the Iowa laws.

"The extension of the Worthington & Sioux Falls road to Sioux Falls next year, with the co-operation of the Sioux Falls people through an organization recently made under the general laws of Dakota, is expected."

Henderson & Overton.

The ties and bridge timbers for this road are now being prepared. The iron has all been contracted for and the first of it was to be delivered at Overton, Tex., this week. The company is trying to secure the completion of the road by fall.

New York Elevated.

The New York Court of Common Pleas has refused to grant the injunction asked for by the Ninth Avenue Railroad Company, which was to prevent the Elevated road from using steam engines; from using any of its turn-outs south of Thirtieth street, and from using any of its road north of Thirtieth street. The Court held that the petitioner has shown no good or sufficient reason why the injunction should be granted.

Pennsylvania.

The connection between the tracks of the Belvidere Division and the Delaware, Lackawanna & Western road at Manunka Chunk, N. J., has been completed. Now that the gauge of the latter road has been altered to the standard, this connection is necessary to permit the exchange of cars. Cars from the Delaware, Lackawanna & Western can now be sent to Philadelphia by this route.

The Altoona (Pa.) *Sun*, of Aug. 12 says: "The wages of conductors and brakemen on the passenger trains of the Pennsylvania Railroad have recently been reduced. Conductors receive 60 cents per day less, and the wages of brakemen have been reduced from $1.75 (or $1.80) to $1.25 per day."

Boston, Everett & Stoneham.

The Boston *Advertiser* says: "The project of a narrow-gauge railroad from Boston through Everett and Melrose to Stoneham, in emulation of the Boston, Revere Beach & Lynn narrow-gauge road, has been for some time entertained by capitalists,

and has resulted already in a survey of the route and the completion of the drawing of the profile of the road. It is stated that a large portion of the right of way has already been pledged, and one capitalist has agreed to take one-sixth of the capital stock and draw his check for the amount. It is also claimed that the people to be benefited by the route are enthusiastic in favor of the construction of the road, and the projectors say that there is no doubt but the people in Everett, Melrose and Stoneham will seize upon the first opportunity to subscribe to the stock."

Erie.

A new arrangement has been adopted to prevent the use of low-priced through tickets to local points. The passenger to Buffalo, for instance, pays $7 for a ticket, but receives with it a drawback order for $2, which is cashed by an agent who passes through the train just before it reaches Buffalo. The same thing is done with tickets to Rochester and other places to which through fares have been reduced.

Natchez, Jackson & Columbus.

The rails on this road are now laid to a point 24 miles eastward from Natchez, Miss., and within two miles of Fayette. The company hopes to have it completed to Fayette and trains running to that point early in September. The road has been under construction for several years but has progressed very slowly, the managers having built only as funds were secured. Of the 24 miles now completed track was laid on 16, from Natchez to Corrie Creek, at the close of last year; eight miles have been laid this year. The road is of an exceptional gauge, 3 ft. 6 in.

Brownsville, Marshall & Eastern.

A company by this name has been organized to build a narrow-gauge railroad from Brownsville, Mo., on the Lexington & St. Louis road, east by north to Marshall, in Saline County, about 16 miles. The capital stock is to be $150,000. The stock subscriptions it is proposed to make payable, 10 per cent. at the time of subscription, and 10 cent. monthly thereafter. The shares are to run 10 years, and to bear 8 per cent. interest, principal and interest to be made payable in transportation over the road when completed. Mr. F. J. Husk, the leading projector of the road, offers to have it completed in four months after the stock is all subscribed.

Chicago, Burlington & Quincy.

This company now runs special dining cars upon its Pacific Express westward from Chicago to Omaha. These cars are specially arranged and used for eating purposes only, and are very completely fitted up. They were used for the first time Aug. 9, when a number of invited guests were taken from Chicago to Aurora and back and handsomely entertained.

Atchison, Topeka & Santa Fe.

We are informed that more than half of the $430,000 notes due in 1882 have been funded in consolidated bonds in accordance with the circular of June 26.

The policy adopted by the directors of the company, which they believe will be fully approved by the security holders, is to use the earnings of the road:

1. To keep the road in good condition and repair.
2. To pay the coupons upon the first-mortgage, land and land income bonds.
3. To pay all other obligations of the company as far as they can do so and avoid creating a floating debt.

New Brunswick.

The extension of the Aroostook Branch is now graded from Fort Fairfield, Me., westward 12 miles to Caribou. The ties are ready and the rails are expected to arrive soon.

Dutchess & Columbia.

This road was sold at public sale under foreclosure of mortgage by C. Wheaton, Referee, in Poughkeepsie, N. Y., Aug. 10. The completed road from Dutchess Junction, N. Y., to Millerton, 59 miles, was sold to J. N. Whiting, of No. 61 Wall street, New York, for $297,500. The remaining property, consisting of the right of way from Dutchess Junction to the Hudson River, was bought by J. P. Lowery for account of the holders of the subordinate mortgages for $40,000.

Mr. Whiting, the purchaser of the road, publishes the following card to the first-mortgage bondholders:

"The agreement proposed for the purchase of the railway and property at the sale under foreclosure of the first mortgage not having been signed by a sufficient number of the bondholders, and no agreement for such purchase having been come to among the bondholders, I gave notice at the sale that I would volunteer to bid, and that if I bought the property I would give any of such bondholders who might within twenty days signify in writing their determination to join in such purchase, an opportunity so to do, according to the amount of such bonds they held. The property was struck off to me at the sale for $297,500. Bondholders desiring to join me in the purchase must give me written notice accordingly before the 1st of September next."

The road was one of those included in the New York, Boston & Montreal consolidation.

Jacksonville, Pensacola & Mobile.

The Pensacola (Fla.) *Gazette* says: "The trustees of this road, appointed by the United States Supreme Court to take possession and sell it, after giving ninety days' notice, have concluded that it is to their interest, personal and political, to hold and operate the road, disregarding the interest of the State and the decree of the court. Attorney-General Cooke, himself a trustee, in the *Floridian* of July 11, denounces the action of the Board of Trustees, of which the Governor is President, and Dennis Eagan, Commissioner of Immigration, and Comptroller Cowgill, are members. The Attorney General says 'they have no moral or legal right to hold the road except for the time necessary to advertise and sell; that they have no legal right to make contracts for repairs or material'—in substance, no right to hold or operate the road. The Attorney General washes his hands of the whole business, and 'disclaims all connection with their acts and doings, in regard thereto'—in all of which he is undoubtedly correct."

Davenport & Northwestern.

The people of Davenport, Ia., will vote, Aug. 26, on the question of levying a nine-mill tax in aid of the extension of this road from East Davenport into the city.

St. Louis, Lawrence & Western.

This company has adopted the Loughridge Air brake for use on its passenger equipment.

Holyoke & Hartford.

The Boston *Advertiser* says: "The survey for the proposed narrow-gauge railroad south from Holyoke on the west side of the Connecticut River, discloses a very feasible route. The firm of D. H. & J. C. Newton, of Holyoke, is at the head of the enterprise, and is supported by the Water Power Company and other manufacturers, and the field has been carefully examined. The survey began on Monday morning, and on Wednesday night the surveyor, Engineer John Sprague, of Conway, was at Gallup's Grove, 12 miles south of Holyoke. He started in Holyoke at the level of the second canal, near the Germania Mills, and says the maximum grade found thus far will rarely exceed 15 feet in a mile, with no cuts or fills of more than 10 feet. In some places the line is nearly straight for a mile together, and at such places the grading will not necessitate a cost of more than $500 a mile. Below Windsor Locks, Conn., the work will be heavier, but none of it will probably be of more than 20 feet grade. From that place to Hartford the tow path of the old canal will probably be used. From Holyoke to Hartford is 36 miles, and it is calculated that the road can be built and equipped for $8,000 a mile, not including land damages. Such a road, it is thought, can transport freight for half the present rates. Holyoke has more freight than any other place in the western part of the State. The idea now is to carry the line north to Northampton, Turner's Falls and Greenfield, and connect with the proposed Green Mountain narrow-gauge road."

Chicago, Saginaw & Canada.

In the New York Supreme Court, Benjamin Richardson has begun suit to recover on protested notes of this company to the amount of $185,588. An attachment on the bonds, money and other property of the company in New York has been granted.

Harrisburg & Potomac, of Maryland.

This company has filed articles of incorporation under the Maryland general law. The road is to be an extension of the Harrisburg & Potomac, of Pennsylvania, and is to extend from the Pennsylvania line near Antietam Creek to the Western Maryland road near Raven Rock bridge. The capital stock is to be $50,000, and the corporators are J. M. Hood, David H. Niles and S. Taylor Shaeffer, of Maryland; Daniel V. Ahl and John Phillips.

International & Great Northern.

The extension of the Western Division to Round Rock, Tex., 42 miles southwestward from Rockdale, and 163 miles from Herne, was fully opened for traffic Aug. 7, when regular trains began to run through to Round Rock. Work is progressing rapidly between that station and Duval, 11 miles southwest, and the track was expected to reach there this week. From Duval it is only nine miles to Austin.

Tyler Tap.

The grading is now completed on 22.7 miles and has been inspected and accepted. Work is still progressing steadily.

Texas Western.

This narrow-gauge road is now completed to Habermacher, Tex., 20 miles west from Houston, and work is actively in progress on an additional section of 30 miles, which will carry the road to a point 50 miles from Houston, where a new town is to be established, which will be called House, after one of the leading supporters of the company.

The equipment now in use consists of 2 engines, 1 passenger car, 3 box and 18 flat cars, besides hand and tool cars. The cost of the 20 miles completed is reported at $174,261, or $8,713 per mile, including equipment. The principal items of cost were: grading, ties and track-laying, $57,000; rails and fastenings, $66,961; buildings, $10,000; engineering and general expenses, $13,000. The 30 miles now under construction will be more expensive, as there is an iron bridge over the Brazos River, which will cost about $75,000.

Wilmington, Columbia & Augusta.

The new shops at Florence, S. C., are now approaching completion. They include a foundry 45 by 48 feet, a machine shop 45 by 70 feet, a smith shop 45 by 48 feet, erecting shop 45 by 28 feet, carpenter shop 45 by 121 feet, car erecting shop 62 by 63 feet, paint shop 48 by 62 feet, and a round-house 225 feet in diameter. Ample provision is made for water supply and drainage. The company is also building a number of small houses to be rented to the men employed in the shops. The grounds occupied by the shops and yard cover 40 acres. All the repair work of the line is to be concentrated at Florence, the shops at Eagle Island and Wilmington being removed to that point.

Portland & Ogdensburg.

A contract has been concluded with the Portland (Me.) Rolling Mill for 3,500 tons of iron rails, which will be sufficient to lay the track of the Vermont Division from Johnson, Vt., to Swanton. The rails are to be delivered as fast as possible and the work of tracklaying will soon be begun.

Louisville, Cincinnati & Lexington.

The Receiver reports for July as follows:

Balance on hand July 1	$310,571 22
Receipts from all sources	118,016 77
Total	$428,587 99
Disbursements	85,551 30
Balance Aug. 1	$343,036 69

The receipts were $32,465.47 in excess of the disbursements.

Columbus & Toledo.

The tracklayers from Delaware, O., southward have reached a point nine miles from Columbus, O., and 15 miles from Delaware. The track is all laid from Carey southeast to Upper Sandusky, 10 miles, and from Carey north by west 15 miles, to Fostoria. Between Columbus and Marion the depot buildings are being put up, and several gangs are at work building fences. Three steam shovels are at work in gravel pits along the line, and the track is being surfaced and ballasted almost as fast as laid. Besides a number of locomotives the company has contracted for 12 passenger and 500 freight and coal cars. The company's bonds are said to be selling freely at 85.

St. Joseph & St. Louis.

The County Court of Buchanan County, Mo., after a long debate and after much conflicting legal advice, has resolved not to levy any tax and not to pay interest on the $400,000 bonds of the county issued in aid of this road in 1868 and 1869.

Wyandotte, Kansas City & Northwestern.

The completed road from Kansas City, Mo., to Lexington has been finally accepted from the contractor, J. McCarty, of Leavenworth, Kan. The company commenced running its own trains over the whole length of the road Aug. 10.

Indianapolis, Cincinnati & Lafayette.

The Receiver has reduced the wages of all employes 10 per cent. from Aug. 10. The notice of the reduction is accompanied by a promise of prompt monthly payments hereafter.

Cazenovia, Canastota & De Ruyter.

This road was sold Aug. 5 under foreclosure of mortgage by Judge Kennedy, Referee. It was bought by S. T. Fairchild and John Fairchild for $88,375.05. The road is in operation from Canastota, N. Y., on the New York Central, southward to Cazenovia, 15 miles, and is intended to run to De Ruyter, some 14 miles further.

Eastern Counties.

There is said to be much dissatisfaction in Cape Breton at the fact that the contract for this road as let does not include any of the line in Cape Breton, as the islanders had been led to expect that it would. The contractors are to receive all the bonus offered and have only to build to the Strait of Canso and to maintain a steam ferry there. The bonus which the contractors will receive is estimated as follows:

Pictou Branch, completed, estimated value (cost $2,700,000)	$1,500,000
Cash bonus of $7,945 per mile of new road	635,600
Crown land, 150,000 acres	150,000
Total	$2,285,600

Being about $28,570 per mile of road to be built, of which, however, only $7,945 per mile is in money. It is said that the new road can be built for $20,000 per mile. The most expensive part to build and the least productive when built would have been the section in Cape Breton, which the contractors are now freed from.

Intercolonial.

A considerable travel of sportsmen and tourists is being developed by the opening of this road through. Some of these are drawn, doubtless, by the desire to see the new line, but there is promise of a fair amount of summer travel for the future, especially of sportsmen. The fishing and shooting on the Miramichi, the Restigouche and the Metapediac are said to be very fine.

The ballasting of the new sections of the line is nearly completed. A large force is still employed on the road, however, principally in the erection of snow-sheds and snow-fences at exposed points.

Missouri, Kansas & Texas.

The Amsterdam bondholders' committee has given notice that on and after July 29, the first-mortgage coupons would be paid with 49.15 florins, the equivalent of $20, gold, according to the agreement to accept 4 per cent. annually for three years. From this payment, however, is made a deduction of 12.50 florins, nearly $5, gold, for expenses of the representatives of the first-mortgage bondholders in the advisory board at New York for the next six years. This leaves the actual payment 36.65 florins, or about $15, gold, being about 1½ per cent. on the bond. The issue of the income bonds is not yet announced.

There is talk of changes in the management of the road and it is said that Mr. Chappell will go back to it shortly. The business of the line is very heavy at present.

Central, of New Jersey.

A correspondent informs us that our statement that the engineers and firemen of this road had gone to work at the reduced rates of pay was not correct.

The fact of the case was that the committee of engineers had one interview with Superintendent Ricker. In that he assured them that the wages of the engineers had not been reduced, and with that assurance the men were satisfied.

It thus appears that the engineers were excepted from the general reduction of wages made on the Central and continue to work at the old rates.

Herkimer & Newport.

It is proposed to build a railroad from the New York Central at Herkimer, N. Y., northward some 14 miles to Newport. Mr. Thomas W. Spencer, of Utica, a well-known contractor, has offered to build the road if a bonus of $50,000 is raised. He is now examining the line.

Pekin, Lincoln & Decatur.

The new company, organized by the bondholders who bought the road at foreclosure sale, has been operating the road since Aug. 1, on which day the Toledo, Wabash & Western formally surrendered possession. It is still, however, worked in connection with the Wabash, though under a separate management. The road is 68 miles long, from Decatur, Ill., to Pekin, and has running arrangements from Pekin to Peoria, 10 miles further, over the Peoria & Springfield.

Springfield, Athol & Northeastern.

At the recent annual meeting the following statement was submitted for the year ending June 30, 1876:

Earnings from freight	$54,108
" " Passengers	39,361
" " other sources	12,257
Total earnings ($2,180 per mile)	$105,726
Expenses (71.80 per cent.)	75,893
Net earnings ($615 per mile)	$29,833
Interest paid	29,100
Surplus for the year	$733

The road is 48⅘ miles long, from Athol, Mass., southwest to Springfield.

Canadian Pacific.

Mr. F. Braun, Secretary of the Board of Public Works of the Dominion of Canada, gives notice that he will receive at his office in Ottawa, Can., up to noon of Sept. 20, tenders for the tracklaying and ballasting of 77 miles of road from Red River to Cross Lake, and the construction, tracklaying and ballasting of 37 miles from Cross Lake to Rat Portage, Lake of the Woods. No tenders will be received except on the printed forms. For plans, specifications, forms of tender and other information, application must be made to the office of the Engineer-in-Chief, Ottawa, Canada.

Savannah & Memphis.

This road is intended to run from Opelika, Ala., northwest through Birmingham to Corinth, Miss., and is completed from Opelika to Goodwater, 60 miles. Work has been suspended since October, 1873, on account of the panic. At the annual meeting held Aug. 5, arrangements were made looking to a speedy extension to Childersburg on the Selma, Rome & Dalton, 26 miles from Goodwater. This extension will give a new and independent outlet northward from Opelika, besides opening up several large deposits of iron ore, slate, lime and marble on the line of the road, and is expected to carry a large coal business from the mines along the Selma, Rome & Dalton.

Grand Junction.

At the annual meeting in Belleville, Ont., Aug. 1, the directors reported that they had not been able to induce any contractors to undertake the work, and that there was no present prospect of the construction of the road.

Simcoe Junction.

A contract has been let for the construction of 26 miles of this road, from Stouffville, Ont., to Jackson's Point, on Lake Simcoe. The contract price is $295,000 and the work is to be done by Oct. 1, 1877. The company has concluded a lease of the road, when finished, to the Toronto & Nipissing Company for 21 years. The lessee is to furnish equipment and to pay 25 per cent. of the gross earnings as rental.

Indianapolis & Sullivan.

Application has been made to the County Commissioners to order an election in Indianapolis on the question of subscribing $100,000 in aid of this road.

Lafayette, Muncie & Bloomington.

This company will shortly resume possession of the 36 miles of its road from Lafayette, Ind., to the Illinois line, which has heretofore been worked by the Toledo, Wabash & Western. It is said that arrangements have been made by which this company will also assume the lease of the Lafayette, Bloomington & Mississippi, which extends its line to Bloomington, Ill.

New York, Westchester & Putnam.

A meeting of the bondholders, who bought the New York & Boston road at foreclosure sale and organized under this name, was held in New York, Aug. 10. The committee previously appointed reported a completed plan of reorganization, which was adopted. The Chief Engineer reported that to complete the road from High Bridge to Brewster's, 50 miles, build depots and buy equipment, would require about $1,000,000. It was also resolved that the new bonds be sold at not less than 85. The trustee reported that $2,416,000 out of $2,500,000 bonds had been deposited and the assessments paid.

The road is about 50 miles long; about half the track is laid, and nearly all the rest graded. The whole issue of securities of the new company will be $1,250,000 common stock, $4,000,000

preferred stock and $1,250,000 first-mortgage bonds. The bonds will be sold to provide means for the completion of the road. The common stock will be exchanged for claims outstanding, etc. Of the preferred stock $3,200,000 will be issued in exchange for the old bonds and unpaid coupons, and $800,000 held in trust pending the result of a suit with the trustees of the New York, Boston & Montreal. If the trustees are successful, the $800,000 will be transferred to them; otherwise the stock will be canceled and destroyed.

Montgomery & Eufaula.

In the suit of Mason Young and others against this company the United States Circuit Court has ordered that all holders of the first-mortgage bonds of the company, alleged to be indorsed by the State of Alabama, must file with J. W. Dimmick, Master in Chancery, at his office in Montgomery, Ala., by Oct. 16, 1876, a statement in writing showing the date, amount and number of each bond and the time of maturity of the first unpaid coupon, and the date of the indorsement thereof, and by what Governor of said State said indorsement was made, and also from whom said bonds were obtained, and the price paid for them to the Montgomery & Eufaula Railroad Company, or the contract by which they were obtained from the Montgomery & Eufaula Railroad Company; which statement shall be verified by the affidavit of the holder of said bonds, or by any person having personal knowledge of the facts.

St. Joseph & Pacific.

As heretofore noted, this is the name of the new company organized by the bondholders who recently bought the Eastern Division of the St. Joseph & Denver City road at foreclosure sale. The road owned by the new company extends from the Missouri River at Elwood, Kan., opposite St. Joseph, Mo., west by north 112 miles, to Maryville. The securities to be issued are: Stock, $1,600,000, or $14,286 per mile; first-mortgage bonds, $1,900,000, or $16,964 per mile; second-mortgage bonds, $1,200,000, or $10,714 per mile. The Western Division bondholders have organized a separate company, under substantially the same management.

Buenos Ayres Southern.

This railroad was completed July 1 and its opening celebrated that day. It connects Buenos Ayres with Azul.

Kansas & Nebraska.

The bondholders who recently bought at foreclosure sale the Western Division of the St. Joseph & Denver City road have organized a new company by this name. The road owned by them extends from Maryville, Kan., the end of the Eastern Division of the same road, northwest to Hastings, Neb., 115 miles, connecting at that place with the Burlington & Missouri River Railroad in Nebraska. The intention was and, we believe, still is to extend the road some 45 miles further to a direct connection with the Union Pacific. The management of the new company is nearly the same as that of the St. Joseph & Pacific, the successor to the Eastern Division of the old road, and the two companies' lines will still continue to be worked as one road.

The securities to be issued by the new company are as follows: Stock, $1,700,000, or $14,783 per mile; first-mortgage bonds, $1,900,000, or $16,522 per mile; second-mortgage bonds, $1,200,000, or $10,435 per mile; land scrip, $2,250,000, or $19,565 per mile; total, $61,304 per mile.

Portsmouth & Dover.

At the annual meeting in Portsmouth, N. H., Aug. 9, it was resolved to issue new stock to the amount of the floating debt, to be offered to the present stockholders at par. Any stockholder who prefers it will have convertible bonds issued to him instead of his proportion of stock.

Poughkeepsie Bridge.

It is understood that the deficiency in the stock subscriptions has been made up and that work will proceed without delay. The payment of the first installment on the subscriptions will be called for very soon.

Delaware, Lackawanna & Western.

Much of the work made necessary by the change of gauge having been finished, the force in the car and machine shops is being reduced. A number of men were discharged last week and others will probably follow. Wages in the car shops have also been reduced.

The crews of the through passenger trains now run through from Hoboken to Binghamton, 210 miles. Heretofore there have been two sets of men to each train, changing at Washington, where the Main Line connects with the Morris & Essex Division. The change allows a reduction in the number of men.

Northwestern Ohio.

A company by this name has filed articles of incorporation in Ohio. The line is to extend from Tiffin, O., northwest through Seneca, Wood, Sandusky, Ottawa and Lucas counties to the Michigan Line. The capital stock is to be $1,000,000.

ANNUAL REPORTS.

Allegheny Valley.

Some figures from this company's report were published at the time of the annual meeting in April last. The complete report for the year ending Dec. 31, 1875, has recently come to hand and from it the following summary is prepared. The mileage worked was as follows:

	Miles.
River Division, Pittsburgh, Pa., to Oil City	132
" " Plum Creek Branch	7
Low Grade Division, Red Bank, Pa., to Driftwood	110
Sligo Branch	10
Total	259

There are 47.06 miles of sidings owned by the company, and 9.67 miles of private sidings on the River Division, 14.89 miles company and 1.63 miles private sidings on the Low Grade Division; 0.51 mile on the Sligo Branch.

The equipment consists of 17 passenger, 45 freight and 12 shifting engines, 74 in all; 31 passenger, 10 baggage and mail cars; 31 caboose, 305 box, 1 stock, 1,137 gondola, 117 wooden and 295 iron tank, 39 coke-rack and 85 stone-flat cars; 1 pay, 3 tool, 12 eight-wheel and 26 four-wheel gravel dump cars. a total of 41 passenger-train, 2,010 freight-train and 43 service cars.

The general account may be summed up as follows:

Stock ($8,365 per mile)	$2,166,500 00
Bonded debt ($87,976 per mile)	22,785,900 00
Bonds and mortgages on real estate	136,443 97
Due other companies	133,030 34
Interest accrued	441,579 28
Interest advanced by Pennsylvania R. R. Co.	1,049,685 00
Accounts and bills payable, current	368,418 86
" " " suspended debt	676,140 22
Total ($107,173 per mile)	$27,757,697 67

The cost of the River Division is reported at $9,472,340.56, or $68,146 per mile; Plum Creek Branch, $143,501.12, or $20,500 per mile; Low Grade Division, $11,353,002.16, or $103,209 per mile; Sligo Branch, $272,977.42, or $27,298 per mile; equipment, $2,395,862.53, or $9,250 per mile worked. Other assets include the Buffalo, Corry & Pittsburgh road, costing $501,634.56; Oil Creek & Allegheny River stock, $1,692,250; Brady's Bend Bridge stock, $30,000. The suspended debt is the yet unfunded balance of debt, which by the agreement in bankruptcy of two years ago was to be funded in income bonds.

The work done was as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Engine mileage, passenger,	466,344	488,130	Dec... 21,786	4.4
" " freight	1,006,755	1,012,138	Dec... 5,383	0.5
" " ballast	136,122	119,872	Inc... 16,250	13.5
Total	1,609,221	1,620,140	Dec... 10,919	0.7
Passenger car mileage	1,562,380	1,444,436	Inc.. 117,984	8.2
Freight " "	16,356,509	15,204,611	Inc. 1,151,898	7.6
Passengers carried	898,767	925,960	Dec.. 127,193	15.4
Passenger mileage	13,336,643	15,366,052	Dec. 1,829,409	11.9
Tons freight carried	2,119,219	1,924,274	Inc.. 194,945	10.1
Tonnage mileage	97,042,724	87,791,191	Inc. 9,251,533	10.5

The traffic was divided as follows:

	River Div.	Low Grade Div.	Sligo Br.	Total.
Passenger mileage	11,552,109	1,813,673	70,861	13,536,643
Tonnage mileage	66,273,275	30,359,927	409,522	97,042,724

Of the tonnage mileage 7.82 per cent. and of the passenger mileage 11.21 per cent. was of through business. Of the freight car mileage 44.49 per cent. was of empty cars. The freight carried included 3,383,904 barrels crude and 591,879 barrels refined oil, and 632,680 tons coal.

The earnings and expenses per train mile and per unit of traffic were as follows:

	River Div.	Low Grade Div.	Sligo Br.	General.
Earnings per train mile	$1 67	$1 50	$1 22	$1 59
Expenses " "	1 02	0 77	0 68	0 94
Net earn. " "	0 65	0 73	0 54	0 65
Earn. per pass. per mile	3.07 cts.	3.41 cts.	3.49 cts.	3.12 cts.
Ex. " "	2 22 "	3.31 "	1.80 "	2.37 "
Net Earn. per pass. per mile	0 85 "	0.10 "	1.69 "	0 75 "
Earn. per ton per mile	2.17 cts.	1.44 cts.	4.49 cts.	1.95 cts.
Ex. " "	1.33 "	0.67 "	2.57 "	1.13 "
Net earn. per ton per mile	0.84 "	0.77 "	1.92 "	0.82 "

For five years past there has been a steady decrease in the average receipt per ton per mile, the total falling off in that time being 24.5 per cent.

The total earnings for the year were as follows:

	1875.	1874.	Inc. or Dec.	P.c.
Freight	$1,895,207 20	$1,823,306 27	Inc .. $71,900 93	3.9
Passengers	421,764 47	508,100 26	Dec.. 86,335 79	17.0
Mails and express	43,043 30	25,320 71	Inc .. 17,722 59	70.0
Rents, etc	39,623 51	32,744 76	Inc .. 6 878 75	21.0
Total	$2,399,638 48	$2,389,472 00	Inc .. $10,166 48	0.4
Working expenses	1,342,141 65	1,380,638 96	Dec.. 38,497 31	2 8
General exp's and taxes	72,854 70	90,145 77	Dec.. 17,291 07	19.2
Total	$1,414,996 35	$1,470,784 73	Dec.. $55,788 38	3.8
Net earnings	$984,642 13	$918,687 27	Inc .. $65,954 86	7.2
Gross earn. pr mile	9,522 33	9,482 03	Inc .. 40 30	0.4
Net " "	3,907 27	3,645 58	Inc .. 261 69	7.2
Pr ct. work'g exps.	55.93	57.78	Dec.. 1.85	3.2
" all "	58.97	61.55	Dec.. 2.58	4.2

The earnings and expenses were divided as follows:

	Earnings.	Expenses.	Net earn'gs.	Earn. pr. mile.	Pr ct. of ex.
River Division	$1,868,193 55	$1,139,935 40	$728,258 15	$13,440	61.02
Low Grade Div.	510,473 65	263,286 87	247,186 78	4,641	51.58
Sligo Branch	20,971 28	11,774 08	9,197 20	2,097	56.00
Total	$2,399,638 48	$1,414,996 35	$984,642 13	$9,522	58.97

On the River Division there was a considerable decrease in freight earnings, mainly attributable to the diversion to the Low Grade Division of the crude oil traffic bound east. On the last named division there was an increase in the tonnage from local mines; it was operated during the whole year in 1875, and but eight months in 1874. The Sligo Branch showed a great increase in traffic, a pipe line having been built with terminus at Sligo.

On the River Division 2,937 tons re-rolled iron and 2,093 tons steel rails and 86,677 new ties were laid. The Poketas bridge was replaced by an iron girder bridge, five other bridges were renewed and 23 short girder bridges replaced by iron. The Verona shops were completed and a new yard made at Phillipsburg, near the junction with the Low Grade Division.

On the Low Grade Division two engine houses and several other buildings were put up, a track scale put up at Driftwood; 103 tons of iron and 10,195 ties were used in repairs. The arching of the Summit tunnel is now well advanced, and the ballasting of the division completed.

The income account was as follows:

Interest on funded and floating debt		$1,608,111 29
Depreciation in old rails and other charges to expenses prior to Jan. 1, 1874	$58,328 20	
Adjustment of old accounts, credit	20,199 89	
		38,128 31
Total		$1,646,239 60
Net earnings		984,642 13
Debit balance		$661,597 47

Under the agreement the interest on $2,271,900 income bonds held by individuals was paid in money; that on $3,132,000 held by railroad companies, in bonds. The contributions by the Pennsylvania, the Philadelphia & Erie and the Northern Central towards the income bond interest under the same agreement were $99,681.89.

BUFFALO, CORRY & PITTSBURGH.

This road extends from Corry, Pa., north to the Lake Shore & Michigan Southern at Brockton, N. Y., 43 miles, and was bought by the Allegheny Valley Company at foreclosure sale. Its cost to the company up to Dec. 31, 1875, including losses and deducting gains in operation was $501,634.56, or $11,666 per mile. The operations for the year were as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Freight	$98,037 68	.....	.....	...
Passengers	50,953 14	.....	.....	...
Other sources	5,810 32	.....	.....	...
Total earnings	$154,801 14	$155,887 40	Dec.. $1,086 26	0.7
Expenses	172,999 70	138,277 31	Inc .. 34,722 39	25.1
Deficit or net earn...	$18,198 56	$17,610 09	.....	...
Gross earn. per mile.	$3,600	$3,625	Dec.. $25	0.7
Per cent. of expenses.	111.76	88.70	Inc .. 23.06	26.0

The unfavorable result of last year is attributed to the very low rates obtained, the tonnage, chiefly in coal, having increased by 34,366 tons over that of 1874, while the freight earnings increased only $193.99. The poor condition of the iron has required heavy renewals, and several trestles were filled up during the year, thus greatly increasing the expenses.

Chesapeake & Ohio Canal.

This canal extends from Cumberland, Md., to the Potomac River at Georgetown, D. C., 184¼ miles, with an extension from Georgetown to Alexandria, Va., 7 miles. The stock of the company is mainly held by the States of Maryland and Virginia.

The chief business is in the transportation of coal from the Cumberland Region. During the year ending Dec. 31, which is that covered by the report, the coal carried was: 1875, 879,838 tons; 1874, 767,064 tons; increase, 112,774 tons, or 14.7 per cent. This increase was in the face of a declining production, the canal shipments having been 37.6 per cent. of the whole shipments from Cumberland as against 31.8 per cent. in 1874. This resulted partly from a reduction of charges, of 8 cents per ton on tolls and wharfage and 3.6 cents on boat tolls, 11.6 cents per ton in all. The boatmen also reduced their charges. By the lease of some wharves at Cumberland the company was last year, for the first time, enabled to control the wharfage charges.

The revenue and expenses for the year were as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Gross revenue	$473,218 40	$517,412 22	Dec. $44,193 82	8.5
Current expenses, repairs, etc	219,043 18	227,204 63	Dec. 8,161 45	3.6
Net revenue	$254,175 22	$290,207 59	Dec. $36,032 37	12.4
Per cent. of expenses.	46.29	43.91	Inc. 2.38	5.4

The decrease resulted from reduction of tolls. The report says:

"The condition of the canal during the entire year was excellent, not a break or serious interruption occurring to delay navigation.

"The greatest number of tons of coal ever shipped over the canal in any month was in June, 1875, being 143,736 tons. * *

"One of the most gratifying features of the trade for the year is the success attained in transporting coal by steamers.

"The number engaged in the trade were six, of which number the Ludlow Patten made twenty-nine round trips, carrying during the season 2,882 11-20 tons, an average of 99 11-20 tons each trip.

"It is claimed, and we think justly, that by the use of steam as a motor the cost of transportation has been reduced 20 per cent., and so satisfactory has been the result to business that contracts have been made for the building of an additional number for the trade of 1876. If the cost of transportation can be reduced, as claimed, the effect will be to largely increase the tonnage of the canal, hence we have given every encouragement in our power to their successful introduction."

The income account was as follows:

Balance Jan. 1, 1875		$98,236 12
Net revenue for 1875		254,175 22
Total		$347,411 34
Tolls refunded, excess	$3,347 87	
Steam machinery and operating	37,326 86	
Overdue coupons paid	233,940 00	
		274,614 73
Balance, Jan. 1, 1876		$72,796 61

The overdue coupons on the preferred construction bonds are now paid up to and including that for Jan. 1, 1864. Nineteen semi-annual coupons have been paid in four years.

Concerning the current year the report says: "During the suspension of navigation the past winter very extensive improvements were made along the line, particularly on the Georgetown Division. Three of the breast-locks were lengthened (one Lock, No. 5, rebuilt) ten feet by removing the breastwalls and putting in new drop gates, so that at the opening of navigation the entire line was in good condition. The continued depression in all branches of industry has so lessened the demand for coal as to seriously affect our business.

"The depression has also induced the shippers of coal from other regions, and transportation lines leading therefrom to tidewater to reduce the price of coal at commercial centers, so that large reduction in prices was necessary in Cumberland coal.

"The Baltimore & Ohio Railroad, recognizing the necessity, made a further reduction of 28 cents a ton, making the charges $2.02 from Cumberland to Locust Point, while the canal was compelled to further reduce its toll 5 cents, making our charge for wharfage at Cumberland and toll to Georgetown 46 cents, the lowest rates ever charged by the company for the same service.

"Notwithstanding these reductions the trade is not as active as we had hoped, the decrease in our tonnage to June 1 being 23,535 tons."

The report calls attention to the great importance of the proposed extention from Cumberland to Piedmont.

Houston & Texas Central.

This company owns and operates the following lines:

	Miles.
Main Line, Houston, Tex., to Red River City	343
Western Division, Hempstead to Austin	115
Waco Branch, Bremond to Waco	47
Total	505

The Main Line is part of one of the two through lines connecting Texas with the North and Northwest, and moreover passes through the best settled and most productive portion of the State. There are 28 miles of sidings.

The equipment consists of 65 engines; 40 passenger, 21 baggage, mail and express cars; 28 caboose, 668 box, 64 stock, 11 combination, 54 coal and 412 flat cars; 80 service cars.

The property is represented by the following securities:

Stock ($15,842 per mile)	$8,000,000
Bonds ($24,481 per mile)	12,363,000
Total ($40,323 per mile)	$20,363,000

The company has a land grant from the State of Texas of 16 sections (10,240 acres) of land per mile of road.

For the year ending April 30, which is the period covered by the report, the work done was as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers carried	254,435	256,621	Dec.. 2,186	0.9
Tons freight carried	373,649	307,998	Inc.. 65,651	21.3
Tonnage mileage	36,415,144	.....	.....	....

The principal items of freight were as follows:

	1875-76	1874-75.	Inc. or Dec.	P. c.
Cotton, bales	306,014	213,167	Inc.. 92,847	43.5
Hides, tons	2,135	2,632	Dec.. 497	19.1
Cattle, sheep and hogs, head	55,876	52,940	Inc.. 2,936	5.5
Lumber, feet	39,134,775	38,646,750	Inc.. 488,025	1.3
Shingles	34,344,000	38,293,500	Dec.. 3,949,500	10.3
Coal, tons	6,608	4,007	Inc.. 2,601	65.0
Flour and grain, tons	56,760	15,351	Inc.. 41,409	269.7
Bacon, tons	5,662	2,887	Inc.. 2,775	96.1

The average receipt per ton carried was $6.42 last year against $6.79 the previous year. The average cost of handling at stations was 21.02 cents per ton against 25.63 cents the previous year.

The earnings for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers	$756,130 41	$831,722 79	Dec.. $75,572 38	9.1
Freight	2,278,573 98	2,343,749 37	Dec.. 65,175 39	2.8
Mails and express	111,178 52	100,335 16	Inc .. 10,843 36	10.8
Miscellaneous	10,423 32	11,010 50	Dec.. 587 18	5.3
Total earnings	$3,156,306 23	$3,286,817 82	Dec.. $130,511 59	4.0
Maintenance of way	499,856 85	.....	.....	....
Rolling stock	659,400 42	.....	.....	....
Transportation	405,191 62	.....	.....	....
Miscellaneous	273,726 88	.....	.....	....
Total expenses	$1,838,175 77	$1,972,090 69	Dec.. $133,914 92	6.8
Net earnings	$1,318,130 45	$1,314,727 13	Inc .. $3,403 33	0.3
Gross earn. per mile	$6,250	$6,500	Dec.. $259	4.0
Net earnings per mile	2,610	2,603	Inc .. 7	0.3
Per cent. of expe.	58.24	60.00	Dec.. 1.76	2.9

The only payments reported from net earnings are $975,000 for interest on funded debt, leaving a surplus of $343,130.46 for the year.

During the year covered by the report 120 miles of the Main Line were of 5 ft. 6 in. gauge, the rest being 4 ft. 8½ in. Since the close of the year the wide gauge section has been changed to 4 ft. 8½ in., leaving the 5 ft. 6 in. gauge only on the Western Division.